

GREATER TORONTO AREA

3Rs ANALYSIS

COST TECHNICAL

APPENDIX

FINAL - MAY 1994



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COST TECHNICAL APPENDIX

Prepared by Resource Integration Systems Ltd.
for
Fiscal Planning and Information Management Branch
Ministry of Environment and Energy

FINAL - MAY 1994



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1.0 INTRODUCTION

1.1 Background

In 1989, the government of Ontario announced its commitment to meeting a Provincial target of at least 50% reduction of waste going to landfills and incineration by the year 2000. This target, a waste **diversion** target to be achieved through waste reduction, reuse and recycling (the 3Rs) was confirmed by the present government in 1990.

To facilitate the achievement of the 50% target, the Province introduced the *Waste Management Act, 1992*. The Act broadens the government's powers to reduce waste sent to disposal through a variety of means. It also vests powers in the Interim Waste Authority (IWA), an agency created to ease the waste disposal crisis in the Greater Toronto Area (GTA). The IWA is complying with its mandate by conducting environmental assessments to locate three, long-term landfill sites in the GTA.

The GTA Regional Municipalities of Peel and Durham are each defined for the IWA process as separate "primary service areas". Metropolitan Toronto and the Regional Municipality of York have been defined as a separate **combined** primary service area. Each of the three defined primary service areas is proposed to receive one new landfill facility identified through the IWA's process. The fifth GTA Regional Municipality, Halton, has already obtained approval for a landfill site and thus is not part of the present siting process.

1.2 Purpose of Study

This study has two purposes, each of which relates directly to a requirement created by the *Waste Management Act*.

The first requirement pertains to waste estimates. Section 14 of the *Waste Management Act* requires the Minister of Environment and Energy to provide a written estimate as to:

- a) *the amount of waste that would otherwise be expected to be generated in the primary service area (i.e. each of Peel, Durham and Metro/York) during a twenty-year period that will not be generated because of waste reduction efforts; and*
- b) *the amount of waste that will be generated in the primary service area during a twenty-year period that will not need to be disposed of in the site because of the reuse or recycling of materials that are or could become waste.*

These waste estimates were provided to the IWA by Minister's letter dated May 15, 1992. A copy of this letter may be found in Appendix A to the EA Input Document. The GTA 3Rs Analysis Study provides additional analysis of 3Rs activities, in support of the reasonableness of the waste diversion estimates previously provided.

The second requirement pertains to analyzing the 3Rs as "alternatives to" landfill waste disposal sites. Section 15 of the *Waste Management Act* requires that the IWA environmental assessments contain a description of, and statement of rationale for the 3Rs, as well as evaluate matters relating to the 3Rs as an alternative to the landfill waste disposal sites. By administrative agreement, MOEE committed to provide such a rationale and evaluation to the IWA for use in its environmental assessments. The GTA 3Rs Analysis Study fulfils this requirement.

A number of parameters guided the completion of the GTA 3Rs Analysis. The study parameters are as follows:

- The study area for the GTA 3Rs Analysis is the area encompassing Metro Toronto and the Regional Municipalities of Durham, York, Peel and Halton. Metro Toronto/York Region, Durham Region and Peel Region are defined in the *Waste Management Act* as the "primary service areas" for the purpose of establishing landfill sites. The Region of Halton has been included as part of the GTA 3Rs Analysis study area as it is part of the GTA. It is not, however, one of the "primary service areas". Thus, 3Rs systems have not been developed and evaluated for Halton Region.
- The MOEE is not the proponent or co-proponent of any 3Rs systems discussed in this study. The study provides additional analysis of 3Rs activities and supplemental data on waste diversion estimates for use by the IWA.
- As stated in Section 15(2) of the *Waste Management Act*,

The environment assessment is not required to contain any description of or statement of the rationale for, or any description or evaluation of any matter relating to,

- a) *an alternative of waste reduction or reuse or recycling if that alternative would involve incineration of waste or the transportation of waste from the primary service area to any other area for disposal; or*
 - b) *an alternative of some other single landfill waste disposal site if the capacity of the other site would appear to be inadequate in view of the estimate provided under Section 14.*
- The *Waste Management Act*, 1992 specified that the IWA landfills are to operate for a minimum of 20 years.

1.3 Study Approach

The GTA 3Rs Analysis identifies and assesses alternative 3Rs systems, composed of combinations of 3Rs programs, technologies and practices, that could reasonably be implemented in the GTA. In this report, this range of reasonable approaches to 3Rs are termed 3Rs system alternatives. It also determines the potential for each 3Rs system to divert waste over the twenty-year minimum life expectancy of the GTA landfill sites and identifies the environmental net effects of each system.

For purposes of the present analysis, an array of conceptually different 3Rs systems have been identified for addressing residential wastes, as well as for industrial, commercial, and institutional (IC&I) wastes. For each system, estimates of the amount of waste the system could potentially divert from disposal have been determined. An assessment, done on a non-site-specific, generic level and documented in this report, identifies the net effects to the environment of each potential 3Rs system, in keeping with the *Environmental Assessment Act*.

In conducting the 3Rs work, and providing estimates of waste that will not require disposal in the IWA established sites, MOEE is acting as a reliable authority in accordance with its legislative mandate, and not as the proponent or co-proponent of any of the 3Rs systems discussed. The alternatives presented in this report are not in any way structured as detailed implementation plans for the Regions or the private sector.

1.4 Purpose of the Cost Assessment and Study Objectives

This technical appendix documents the cost input into the GTA 3Rs analysis. Cost effects in this study are defined as potential for increased system costs which may occur as a result of the implementation of a 3Rs system within each of the four Regional municipalities (Durham, Metro Toronto, York and Peel).

The study objectives of the cost assessment are as follows:

- Identification of existing waste management costs in each of the four regional municipalities;
- Prediction of cost effects as a result of implementation of any of the alternative 3Rs systems within each of the four Regional municipalities;
- Ranking the systems of the four Regional municipalities from the perspective of cost.

1.5 Outline of Report

Chapter 2 presents the study approach followed in the Cost assessment.

Chapters 3-7 present residential system cost estimates for existing and alternative systems for the Regions of Durham, Metro Toronto, York, Peel and Halton.

Chapter 8 provides IC&I system cost estimates for existing and alternative systems.

Chapter 9 details the net effects analysis process undertaken by the Cost discipline. The six alternative systems are measured and compared for the residential sector (on a region by region basis) and for the IC&I systems (on a GTA-wide basis) according to established criteria.

Chapter 10 summarizes the results of the analysis carried out by the Cost discipline.

2.0 APPROACH

This section outlines the approach used to identify potential cost effects of different residential and IC&I 3Rs systems.

2.1 Overview

The GTA 3Rs Analysis assessed six residential and six IC&I waste diversion systems. The six residential systems are:

- System 1 - Existing;
- System 2 - Existing/Committed;
- System 3 - Direct Cost;
- System 4 - Expanded Blue Box;
- System 5 - Wet/Dry;
- System 6 - Mixed Waste Processing.

The six IC&I systems are:

- IC&I System 1 Existing;
- IC&I System 2 Existing/Committed;
- IC&I System 3 Extended 3Rs Regulations;
- IC&I System 4 Expanded 3Rs Regulations;
- IC&I System 5 Expanded 3Rs Regulations with Organics;
- IC&I System 6 No Unprocessed Waste to Landfill.

The components of these systems are presented in a series of tables contained in Schedule A.

Cost estimates for each residential and IC&I system were used to carry out a comparative analysis of systems by the Cost Discipline. These estimates were based on available data on the costs currently experienced by residential and IC&I systems in the GTA. Where GTA data were not available on the costs of a particular 3Rs component, costs were obtained from other North American programs.

Capital and operating costs were developed separately for each residential system for each Region. Capital costs included estimated capital expenditures required for the components of each residential 3Rs system.

Operating costs for each residential system were estimated using a unit cost approach. Unit operating costs were developed for each method of waste management (Blue Box collection and processing, yard waste collection and processing, backyard composting, other waste diverted, garbage collection and disposal, wet/dry collection and processing, mixed waste processing and composting). These unit costs covered a capital allowance for the elements of each processing method, in addition to the on-going operating expenses. Unit operating costs were multiplied by the number of tonnes managed by the method in each system to estimate the total operating costs for each system.

No attempt was made to estimate capital costs of future IC&I systems, as IC&I waste management (diversion and disposal) is generally handled by the private sector, and it was therefore assumed that the prices charged for waste management include an allowance for constructing additional processing facilities on an as-required basis.

Unit costs of collection, recycling and disposal of IC&I wastes were estimated for each general category of waste material generated by the IC&I sector. These unit costs were applied to the

quantities of each material diverted or disposed in each of the six IC&I systems to estimate the system costs (diversion plus disposal).

2.2 Impact Assessment Criteria

The Cost Discipline used one criterion, cost per household per year for the waste management system (diversion and disposal), for assessment of residential systems. This criterion takes the costs of diversion systems (and the resulting disposal cost savings) into account, and is the most appropriate criterion for comparing residential 3Rs systems.

Two criteria were used by the Cost Discipline to evaluate the six IC&I systems. These included cost per tonne diverted (measured as the total costs of the diversion system divided by the number of tonnes diverted), and total system cost (diversion plus disposal) in \$ million/year. These indicators show how cost efficient a particular diversion system is, and also how the total system costs change as the rate of diversion varies.

The rationale for the cost indicators chosen is presented in Table 2.1.

2.3 Data Sources and Methods of Analysis

2.3.1 Residential Systems

Data Sources

Data on costs of various components of residential systems were obtained from staff at GTA Regions and lower tier municipalities, and also from haulers and recyclers who provide waste management services to the residential sector in the GTA. Where GTA data were not available on the costs of a particular 3Rs component (which is not used in the Existing system, but formed part of one of the residential systems considered), costs were obtained through a review of the available literature, and through telephone contact with operators of 3Rs programs throughout Ontario, the rest of Canada, and the U.S.

All systems analysis is based on the best available information. The study team contacted representatives of each region and municipality in the GTA to gather information related to costs of the Existing and Existing/Committed Residential waste diversion systems. Other waste diversion programs were either contacted or studied to obtain information related to component and system costs. For instance, data related to capital and (unit) operating costs of various components of existing Wet/Dry and Mixed Waste Processing systems (e.g. processing facilities, collection systems, bins, trucks, etc.) were collected through a review of the literature, and telephone contact with staff in a number of jurisdictions.

Informal meetings were held with Regional staff in June/July 1993 to discuss the unit operating costs used. In some cases updated information was provided. In addition, any updated information received either informally or formally from regional staff during the public consultation period for the draft documents (November 1993 to March 1994) was incorporated into the estimates.

Approach

Available cost data provided by staff from each of the GTA Regions were reviewed, and the number of tonnes handled by each processing and collection method were determined. Total costs were divided by the number of tonnes handled by each method (e.g. yard waste

Table 2.1

System Evaluation Criteria for Cost Residential and IC&I Systems

Criteria Group/Criteria	Indicator	Definition	Rationale
Cost (Residential)			
Cost per Household (system)	<ul style="list-style-type: none"> the cost of the waste management system including diversion and disposal on a per household basis 	The net cost of the waste management system (diversion and disposal) after revenue sources have been taken into account, divided by the total number of households within the Region	Considers savings in disposal costs resulting from diversion systems, and addresses the goal of minimizing cost
Cost (IC&I)			
Diversion System Cost	<ul style="list-style-type: none"> the cost of the diversion system as expressed as cost per tonne diverted 	The net cost of the diversion system divided by the number of tonnes diverted, expressed as \$/tonne diverted	Addresses the goal of minimizing cost
Total System Cost	<ul style="list-style-type: none"> the cost of the total waste management system (disposal plus diversion) 	The net cost of the waste management system (diversion and disposal) in \$/year	Considers savings in disposal costs resulting from diversion systems, and addresses the goal of minimizing cost

collection) to calculate the unit operating cost for each waste management method in \$/tonne. Estimates were developed using 1992 operating and cost data where available.

The number of tonnes managed by each method for each system in the year 2000 were then estimated and multiplied by the unit costs for each waste management method to estimate system costs in each Region in the year 2000. To provide a common basis of comparison, the total system and diversion system costs (in \$ million/year) were divided by the total number of households in each Region in the year 2000 (single family detached, semi and low rise, and high rise) to estimate the \$/household costs presented in this Appendix. This calculation does not take into account the fact that different types of households (e.g. rural, multi-family) receive different levels of service. This approach was used because of the difficulty in reconciling information received from different sources on the actual number of households receiving different levels of service.

Limitations of Approach

The unit cost method of analysis does not take economies of scale and future system efficiencies into consideration. Therefore, this method may overestimate system costs in some cases, and may underestimate system costs in others, but provides a reasonable basis for comparative evaluation of systems.

2.3.2 IC&I Systems

Data Sources

Information on which the unit rates used in the IC&I system cost analysis were developed was obtained through discussions with haulers, recyclers and IC&I waste generators in the GTA, and a review of available in-house data on rates charged to various private-sector clients for different types of recycling and waste management service.

Data on costs of IC&I systems were difficult to obtain. Many IC&I establishments contract privately for waste and recyclables collection and due to the competitive nature of the business, haulers were reluctant to share this information with the study team.

Approach

The cost of the IC&I systems was developed by assigning unit rates per tonne for the costs of collection and recovery (net of revenue) and disposal for a number of material categories generated by the IC&I sector, and for which waste composition information was available.

Limitations of Approach

The data on which the analysis was carried out have a number of limitations. Firstly, the extent to which landfill tipping fees in the GTA impact on the pricing of various waste management methods is not known, and these have changed significantly during the course of the study. The GTA landfill tipping fees were \$150/tonne at the beginning of the project, and dropped to \$80-\$90/tonne during the project. They were reduced to \$50/tonne on May 1, 1994. Secondly, the unit cost method of analysis does not take economies of scale and future system efficiencies into consideration. However, because of the large number of IC&I generators who generate materials at different rates and receive different levels of recycling and waste management service, an overall average rate applied across the GTA is the most reasonable method of estimating system costs. Therefore, this method provides a reasonable basis for comparative evaluation of systems.

2.3.3 Methods of Analysis

Each of six residential and six IC&I waste diversion systems were evaluated in a Net Effects Analysis process. This involved a systematic analysis of each system according to the criteria outlined in Section 2.2. Residential systems were analysed on a Region by Region basis while the IC&I systems were analysed at the GTA-wide level. A technical ranking, from highest to lowest, was provided for each system, for each Region for the residential systems and for the GTA as a whole for the IC&I system.

2.3.4 Consultation

As part of the GTA 3Rs Analysis, a public and agency consultation program was conducted. As discussed in detail within the GTA 3Rs Analysis EA Input Document, key consultation activities which were undertaken included documentation distribution, attendance at IWA Information Centres, meetings with municipal representatives, review of participant's reports and telephone contacts with stakeholders.

Based on these and other activities, data upgrades and revisions to the documentation were made. Appendix A of the EA Input document summarizes comments received and responses to them.

2.4. Assumptions

2.4.1 General Study Assumptions

General assumptions used in the analysis include the following:

- The study period extends from 1996 to 2015;
- Markets will be available for the recycled materials and compost from source separated compostables;
- Residential waste diversion systems are developed and analyzed separately for each GTA Region. However, because there is no effective waste management boundary for IC&I waste and recyclables (IC&I waste management is not confined by municipal boundaries), IC&I waste diversion systems are developed for the GTA as a whole;
- Regulations identified in the IC&I systems are assumed to be enforced equally throughout the province and for all systems;
- 3Rs components would be developed in a manner that fulfils the necessary MOEE approvals (e.g. Certificate of Approval);
- The 3Rs systems developed are considered reasonable, they represent a range of plausible diversion approaches and do not necessarily represent the highest possible diversion at all times;
- The mixing and matching of 3Rs components beyond what is done in this report is possible but not assessed due to the large number of possible permutations and combinations;
- The net effects analysis is based on the year 2000, the year in which all systems are assumed to be fully operational;

- The analysis is generic; specific sites/locations for new facilities for each of the systems were neither known nor considered;
- The potential effects of landfill were not considered in the systems net effects;
- The effects of a facility are attributed to the region which uses it;
- All systems were analyzed to the same level of detail;
- It is assumed that larger facilities will be sited to minimize effects (i.e. located in areas most compatible with the facility) through a systematic site selection process;
- The mitigation measures identified are readily available and would be implemented effectively;
- The diversion rate estimates were generated for the year 2000 (the year by which the systems were assumed to be fully operational) and for the 20 year cumulative study period. Increases in diversion rates after the year 2000 are attributed to source reduction;
- A combined diversion rate estimate was determined for Metro Toronto and the Region of York. Alternative systems, however, were evaluated separately for these two Regions;
- Only effects directly attributable to the 3Rs systems development and operation were considered;
- For all of the residential 3Rs systems, it is assumed that the system would be designed and managed such that there would not be any increase in the total number of collection vehicle trips in any residential area, or any increase in the net amount of time required to pick up materials;
- The export of waste, for the purposes of this study, was considered disposal.

2.4.2 Capital Costs of Residential Systems

The assumptions used to develop capital costs for each of the residential waste diversion systems are listed below. The assumptions that are common to each of the residential systems are presented as general assumptions. The assumptions specific to a particular system are presented under the system heading.

General Residential System Capital Cost Assumptions

1. Capital costs are presented for system components (such as MRFs, central composting plants and mixed waste processing and composting plants) which have a design capacity for the quantities of material which would be processed in the year 2015. All facilities required for system operation are assumed to be constructed and fully operational by the year 2000. The benefits of phasing in construction to save some capital costs are not addressed.
2. Existing MRF capacities were taken from available information collected during the original project survey (spring 1993). In some cases, the quantities processed in 1992 are greater than the reported MRF capacities. Where the stated capacity of

any facility is less than the quantities of waste processed by an existing residential system, it has been assumed that capacity is at least equal to the tonnage processed in 1992.

3. The capital costs of all major system facilities (MRFs, central composting facilities and mixed waste processing and composting facilities) are based on an assumption that the facilities will operate 250 days per year in the year 2015. The daily throughput calculated on this basis was used to estimate capital costs of facilities.
4. The capital costs of MRFs are based on the estimated cost of \$14.5 million for a 40,000 tonne/year facility estimated for the Region of Peel (Cave, 1994). It was assumed that this facility operated on a one shift per day basis, and costs were prorated to other facilities assuming that they process quantities of dry materials recovered in the year 2015 on a two-shift per day, 250 day/year basis.
5. For all systems in all Regions, it has been assumed that one new MRF would be constructed to process all dry materials handled by the system in the year 2015. The exception to this decision is Metro Toronto, where existing facilities were assumed to have capacity to process 100,000 tonnes/year, and one new MRF was included in each system to process quantities in excess of 100,000 tonnes/year.
6. Open windrow leaf and yard waste composting sites are assumed to have adequate capacity to process any increased quantities recovered by future systems, therefore costs are not included for expansion of leaf and yard waste composting facilities to process future waste quantities.
7. The table below presents the proportion of total households which were single-family in each GTA Region in 1991. This value was applied to the number of households in each region in the year 2000 to estimate the total number of single-family households in each Region in that year. The number of single-family households in each Region was used to develop the costs of backyard composter distribution, wet/dry cart purchase and Direct Cost system revenues.

Region	Single Family Households			Multi-Family Households		
	Single Family (%)	Semi-Town Row (%)	Total Single Family (%)	Low Rise (%)	High Rise (%)	Total Multi-Family (%)
Metro	33.2	18.1	51.3	12.8	35.8	48.6
Durham	69.0	16.3	85.3	6.8	7.9	14.7
Halton	65.6	14.8	80.4	4.8	14.7	19.5
Peel	49.4	23.1	72.5	4.1	23.3	27.4
York	79.8	9.2	89.0	3.4	7.6	11.0
GTA Total	45.7	17.6	63.3	9.4	27.0	36.4
Source: Hardy Stevenson and Associates, 1994.						

8. For all systems beyond Existing/Committed, costs are included for the purchase of backyard composters for 80% of single-family households in each Region in the year 2000. Purchase costs for backyard composters assume a unit rate of \$60/composter. Methods of cost recovery from the householder are not addressed in the analysis.
9. For the Existing and Existing/Committed systems, the number of backyard composters provided in the year 2000 (included in capital cost estimates) remain at constant coverage levels (e.g. 15%, 20% of single family households, etc.) adjusted for increased household numbers. The coverage level for the Existing System is based on the number of single-family households in each Region which had backyard composters in 1992. The coverage level for the Existing/Committed System is based on the number of single-family households in each Region which would have backyard composters based on Regional commitments to purchase additional backyard composters.
10. Capital cost estimates do not include an allowance for purchase of new vehicles. These are assumed to be covered in fleet replacement allowances.
11. Costs shown are rounded to the nearest \$100,000.
12. All costs are shown in 1992 Canadian dollars (\$1992).

Wet/Dry System Assumptions

1. Capital costs of central in-vessel composting plants are based on an estimated cost of \$22 million Canadian for a 250 tonne/day facility (Cedar Grove Composting Company, 1993). It is assumed for capital cost development that each GTA Region will have only one central in-vessel composting facility, and that it will handle annual quantities of wet waste recovered in that Region in the year 2015 on a 250 day/year basis.
2. There are many ways of collecting residential wastes in a three stream system. A cart based system has been used for this analysis. It has been assumed that 240L (90-gallon) carts will be distributed to all single-family households receiving wet/dry collection. Costs are presented for supply of the number of carts required by the year 2000, at a cost of \$100/cart.
3. It has been assumed that the trucks used for wet/dry collection will not cost more than the existing truck fleet, therefore no additional capital allowance is included for special truck purchase. The cost of the new trucks is assumed to be covered in fleet replacement cost allowances.
4. Capital costs of central composting facilities are based on facilities with a design capacity to process all waste estimated to be collected by the three stream system (food and yard waste), with a contingency allowance of 50% of the waste estimated to be diverted through backyard composters.
5. It is assumed that existing open windrow leaf and yard waste composting sites would be closed if a Wet/Dry system is implemented. The rationale for this decision is that (depending on the three-stream system design) leaf and yard waste may be collected along with food and yard waste, therefore it may not make sense to send it to a separate facility and maintain two processing facilities for source separated organics.

Mixed Waste Processing System Assumptions

1. Capital costs of mixed waste processing and composting plants have been developed assuming that only one facility would be constructed in each Region. The exception to this rule is the mixed waste processing and composting system for Metro Toronto, where two plants have been assumed, because of the large size involved.
2. Costs of mixed waste processing and composting facilities are based on a constructed cost of \$63 million Canadian for the 600 tonne/day Pembroke Pines facility in Florida. This is an enclosed windrow facility but is considered comparable (in cost terms) to facilities that might be constructed in GTA because of its relatively sophisticated pre-processing and control system. It is also one of the larger mixed waste processing and composting facilities for which capital cost data could be obtained.

2.4.3 Operating Costs of Residential Systems

Region-specific operating cost data are discussed in chapters 3 to 7 of this Appendix. A number of common assumptions were used in developing operating costs for residential systems in all Regions. These are discussed below.

General Assumptions

1. Backyard composting costs are estimated assuming a diversion cost of \$45/tonne, based on information obtained from City of Mississauga staff (Rivers, 1994). This cost is consistent with a rate of \$55/tonne estimated for GVRD (Cedar Grove Composting, 1993) and higher than rates of \$25/tonne estimated for Region of Durham (Compost Management Associates, 1992, 1993).
2. System costs are estimated using two unit disposal rates, \$50/tonne and \$100/tonne for all Regions. This is the range of disposal rates considered likely to be encountered in GTA for the foreseeable future.
3. Specific overhead costs allocated to waste diversion in each Region are not included, because of difficulties in identifying these costs.
4. MOEE funding of diversion systems was not considered in the Cost Discipline analysis, as this funding is expected to disappear early in the planning period for this study (1996 to 2015).
5. Revenues from sale of recyclables are included in cost estimates.

Direct Cost Assumptions

1. There are many types of Direct Cost systems, including fixed rate, variable rate, weight based and other variations. For the GTA 3Rs analysis, it has been assumed that a "Pay by the bag" system, where each garbage bag costs \$1, (i.e. no free disposal allowance) will be implemented. This cost is in line with actual costs for garbage management identified in Direct Cost studies (Proctor and Redfern 1993, RIS 1991).
2. Multi-family units or homes not receiving curbside garbage collection service are not included in the estimates of revenues generated by the Direct Cost System.

3. Direct Cost System revenues for each Region have been calculated assuming that all single-family households receive curbside garbage collection service, that each household will use an average of 2 bags/week (104 bags per year), and would therefore pay an average of \$104/year for garbage management.
4. The Direct Cost system developed for the 3Rs analysis is designed for waste diversion only, that is, as an economic incentive for households to use Blue Box collection, leaf and yard waste collection and backyard composting (all of which are available methods of waste diversion which are provided at no direct charge to the householder) to divert as much waste as possible. The garbage management rate assumed for this analysis (\$1/bag) has not been designed to generate revenues to fund other waste management programs.

Wet/Dry System Assumptions

1. A three stream wet/dry collection cost of \$77/tonne has been assumed for all Regions based on a review of a number of sources (Mississauga, 1994, in-house files, etc)
2. Central in-vessel composting system operating costs were based on an annualized capital cost which varied from Region to Region, and an operating and maintenance (O&M) cost of \$35/tonne based on estimates recently provided to the Greater Vancouver Regional District (Cedar Grove Composting Company, 1993). Composting costs used for the analysis are summarized by region below:

Region	Annualized Capital (\$/tonne)	Operating and Maintenance (\$/tonne)	Total (\$/tonne)
Durham	49	35	84
Metro Toronto	27	35	62
York	41	35	76
Peel	37	35	72

Annualized capital is estimated using a 15-year amortization at an interest rate of 11.5%

Mixed Waste Processing System Assumptions

1. A mixed waste processing and composting operating and maintenance cost of \$53/tonne has been used for all plants, based on data from the Martin County facility in Minnesota (see Schedule G, Service Technical Appendix). The capital allowance per tonne varies by Region, because of the different sizes of plants involved. Capital and operating costs used are as follows:

Region	Annualized Capital (\$/tonne)	Operating and Maintenance (\$/tonne)	Total (\$/tonne)
Durham	52	53	105
Metro Toronto	37	53	94
York	45	53	98
Peel	47	53	100

2.5 References

- Cave, R. and Associates, 1994. *Coordinated Material Recovery System Study - Final Report to the Regional Municipality of Peel, Waste Management Division*. February, 1994
- CH2M Hill Engineering Ltd, in Association with Cedar Grove Composting Company and Resource Integration Systems Ltd. *Technical Memorandum No. 3, Composting*, Report to Greater Vancouver Regional District and Ministry of Environment Lands and Parks, June 1993.
- Compost Management Associates, 1992. *A Field Examination of the Cost Effectiveness of Waste Diversion Potential and Homeowner Acceptance Backyard Composting Units. Phase II-The Pickering Research*.
- Compost Management Associates Ltd., 1993. "A Field Examination of the Cost-Effectiveness, Waste Diversion Potential, and Homeowner Acceptance of Backyard Composting Units, Phase II: The Pickering Research, 24 Month Report." June 1993.
- Future Urban Research, 1994 *GTA 3Rs Analysis, Municipal Finance Technical Appendix*
- Goldstein, N., J. Glenn, 1992, *Solid Waste Composting Plants Face the Challenges. BioCycle*. December, 1992.
- Goldstein, N., J. Glenn, 1992a, *MSW Composting Plants Learn From Experience. BioCycle*. December, 1992.
- Hardy Stevenson and Associates, 1994. *GTA 3Rs Analysis, Social Environment Technical Appendix*
- Proctor and Redfern Ltd. 1994. *City of Mississauga's Waste Minimization Demonstration Pilot Project: Executive Summary*, February, 1994.
- Proctor and Redfern Limited. 1993. *Town of Cobourg's Curbside "User Pay" Feasibility Study*, January 1993.
- Resource Integration Systems Limited. 1990. *Generator Pay Systems: A Discussion Paper*. Prepared for the Recycling Advisory Committee
- Steuteville, R., 1994, *Awards, Upheaval, and the World's Biggest MRF*, in *BioCycle*, February, 1994.

Personal Communication

- Goldstein, N. 1993. Personal communication with N. Goldstein, *BioCycle*, March, 1993.
- Henselman, D. 1994. Personal communication with D. Henselman, Martin & Faribault County, Minnesota, Mixed Waste Processing Facility, April, 1994.
- Rivers, R. 1994. Personal communications with R. Rivers. City of Mississauga. March to April, 1994.

3.0 REGION OF DURHAM RESIDENTIAL SYSTEM COST ESTIMATES

The capital and operating cost estimates for the six Region of Durham residential systems are discussed in this chapter. The system development process is described in Section 5 of the EA Input Document and Section 3 of the Service Technical Appendix.

Schedule A of this Appendix lists the components of the residential systems. Components italicized in the Existing and Existing/Committed Systems are those components which must be added to provide the same level of 3Rs service throughout the study period (to accommodate projected population increases). Components italicized in Systems 3 to 6 are the components which have been added to the Existing/Committed System which is the base for systems development.

3.1 Capital Costs

Capital costs for the six residential systems in Region of Durham are presented in Table 3.1. These are discussed by system below.

System 1 — Existing

The Existing System in Region of Durham would process approximately 38,500 tonnes/year of dry materials in the year 2015. The existing Durham MRF was at capacity in 1992, therefore a new MRF, at an estimated capital cost of \$9,300,000 would be required to meet the needs of the study period.

The Region of Durham had distributed 22,450 backyard composters by the end of 1992. This equated to 18.7% coverage of all single-family households. An additional 6,600 backyard composters would need to be distributed by the year 2000, at a capital cost of \$397,000, to maintain the same coverage level.

Total Capital Cost: \$9,697,000.

System 2 — Existing/Committed

Region of Durham has not committed to expansion of diversion programs in the foreseeable future. The 5 year capital commitments for waste diversion contained in the 1993-1997 Region of Durham capital budget included the following:

- \$2,788,000 for MRF improvements;
- \$702,000 for changes to the MRF and depot operations;
- \$365,900 for backyard composting program.

It has been assumed for this analysis that a new MRF would be constructed at a cost of \$9,600,000. If a new MRF is constructed, expenditure of the \$2,788,000 allocated to improvements to the existing MRF may not be necessary.

The Region had distributed 26,450 backyard composters by the end of 1993, providing coverage of 21.3% of all single-family households. An additional 6,700 backyard composters would be purchased (at a cost of \$402,000) to maintain this coverage level in the year 2000.

**Total Capital Cost: \$11,070,000 (without MRF improvements) to
\$13,858,000 (with MRF improvements).**

Table 3.1
Region of Durham
Capital Costs for Residential Systems (Diversion Plus Disposal)

System 1 Central	System 2 Backyard Composting	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6 Mixed Waste Processing
<p>new MRF \$9,300,000 (38,500 tonnes/year)</p> <p>\$397,000 to distribute 6,600 byc to maintain 18.7% coverage of single-family households</p>	<p>\$9,600,000 new MRF (40,000 tonnes/year)</p> <p>\$402,000 for 6,700 byc to maintain 21.3% coverage of single-family households in year 2000</p> <p>\$2,788,000-MRF improvements (1993 capital budget) (may not have to spend)</p> <p>\$702,000- MRF and depot modifications (1993 capital budget)</p> <p>\$365,900 - distribution of 4,000 byc and other composting (1993 committed capital budget)</p>	<p>\$11,100,000 new MRF (51,600 tonnes/year)</p> <p>\$5,480,000 for 91,270 byc to reach 80% coverage of single-family households by year 2000</p> <p>\$702,000- MRF and depot modifications (1993 capital budget)</p> <p>\$365,900 for distribution of 4,000 byc and other composting (in 1993 capital budget)</p> <p>\$2,788,000-MRF improvements (1993 capital budget) (may not have to spend)</p>	<p>\$12,300,000 new MRF (60,400 tonnes/year)</p> <p>\$5,480,000 for 91,270 byc to reach 80% coverage of single-family households by year 2000</p> <p>\$702,000- MRF and depot modifications (1993 capital budget)</p> <p>\$365,900 for distribution of 4,000 byc and other composting (in 1993 capital budget)</p> <p>\$2,788,000-MRF improvements (1993 capital budget) (may not have to spend)</p>	<p>\$12,300,000 new MRF (60,400 tonnes/year)</p> <p>\$15,550,000 for 155,530 household carts by year 2000</p> <p>\$23,000,000 composting facility (67,000 tonnes/ year)</p> <p>\$5,480,000 for 91,270 byc to reach 80% coverage of single-family households by the year 2000</p> <p>\$702,000- MRF and depot modifications (1993 capital budget)</p> <p>\$365,900 for distribution of 4,000 byc and other composting (in 1993 capital budget)</p> <p>\$2,788,000-MRF improvements (1993 capital budget) (may not have to spend)</p>	<p>\$9,600,000 new MRF (40,000 tonnes/year)</p> <p>\$5,480,000 for 91,270 byc to reach 80% coverage of single-family households by the year 2000</p> <p>\$69,400,000 for mixed waste processing and composting plant (176,000 tonnes/year)</p> <p>\$702,000- MRF and depot modifications (1993 capital budget)</p> <p>\$365,900 for distribution of 4,000 byc and other composting (in 1993 capital budget)</p> <p>\$2,788,000-MRF improvements (1993 capital budget) (may not have to spend)</p>
<p>Total capital cost \$9,697,000</p>	<p>Total capital cost \$13,858,000 with MRF improvements \$11,070,000 without MRF improvements</p>	<p>Total capital cost: \$20,436,000 with MRF improvements \$17,648,000 without MRF improvements Revenues: \$16,200,000 in year 2000</p>	<p>Total capital cost \$21,635,000 with MRF improvements \$18,848,000 without MRF improvements</p>	<p>Total capital costs \$60,186,000 with MRF improvements \$57,398,000 without MRF improvements</p>	<p>Total capital cost \$88,336,000 with MRF improvements \$85,548,000 without MRF improvements</p>
<p>Notes:</p> <ul style="list-style-type: none"> All values in \$1992 Facilities sized for processing requirements in year 2015 "byc" refers to backyard composters Costs for backyard composters, and household carts (for wet/dry system) shown to service number of single-family households in the Year 2000 Direct cost revenues shown for year 2000 All MRFs sized and costed to run at 2 shifts/day, 250 d/year in the year 2015, one new MRF for each Region for each system Central composting and mixed waste processing and composting plants sized to run 250 days/year, with capacity to process tonnes generated in year 2015 					

System 3 — Direct Cost

Capital

The Direct Cost system would process 51,600 tonnes of dry material by the year 2015. A new MRF at a cost of \$11,100,000 would be required to meet this need. Depending on how and where the new MRF is constructed, it may not be necessary to spend the \$2,788,000 currently budgeted for MRF improvements.

Purchase of an additional 91,270 backyard composters, at a cost of \$5,480,000 will be required to provide coverage to 80% of single-family households in the year 2000.

Revenues

Direct Cost system revenues in the year 2000 would be approximately \$16,200,000, based on service to 155,533 single-family households.

Total Capital Cost: **\$17,648,000 (without MRF improvements) to**
 \$20,436,000 (with MRF improvements)
Revenues (Year 2000): **\$16,200,000**

System 4 — Expanded Blue Box

Capital costs for the Expanded Blue Box System consist of:

- \$12,300,000 for a new MRF to process 60,400 tonnes/year;
- \$3,855,900 for miscellaneous capital commitments in the 1993-1997 regional Capital Budget (see System 2 — Existing/Committed for explanation);
- \$5,480,000 for 91,270 backyard composters (see System 3—Direct Cost for rationale).

Total Capital Cost: **\$18,848,000 (without MRF improvements) to**
 \$21,635,000 (with MRF improvements)

System 5 — Wet/Dry

Capital costs for the Wet/Dry System include:

- \$12,300,000 for a new MRF to process 60,400 tonnes/year;
- \$15,550,000 to provide roll-out carts to 155,530 single-family households by the year 2000;
- \$23,000,000 for a new central in-vessel facility with a capacity of 67,000 tonnes/year;
- \$3,855,900 for miscellaneous capital commitments in the 1993-1997 regional Capital Budget (see System 2 — Existing/Committed for explanation);
- \$5,480,000 for 91,270 backyard composters by the year 2000.

Total Capital Cost: **\$57,398,000 (without MRF improvements) to**
 \$60,186,000 (with MRF improvements)

System 6 — Mixed Waste Processing

The capital costs of the Mixed Waste Processing System consist of:

- \$9,600,000 for a MRF to process 40,000 tonnes/year;
- \$3,855,000 committed in 1993-1997 capital budget for MRF and depot improvements and purchase of 4,000 backyard composters;
- \$5,480,000 for an additional 91,270 backyard composters needed to provide coverage to 80% of single-family households;
- \$69,400,000 for a mixed waste processing and composting plant with capacity of 176,000 tonnes/year.

Total Capital Cost: **\$85,548,000 (without MRF improvements) to
\$88,336,000 (with MRF improvements)**

3.2 Unit Operating Costs

General unit operating costs used for all Regions are discussed in Chapter 2. Unit costs specific to Region of Durham are discussed in this section.

Blue Box Collection and Processing

The Blue Box collection cost of \$103/tonne was used, based on Durham's cost of \$1,767,000 to collect 17,166 tonnes of dry recyclables curbside (excluding materials collected at Igloos) in 1992 (Watson, 1993).

Blue Box processing costs were based on Durham's 1992 operating costs of \$3.4 million to process 21,000 tonnes of materials, which gives a unit cost of \$162/tonne (Watson, 1993). A number of improvements were initiated at the Durham MRF in early 1994 which should lower operating costs. Updated cost information was not available at the time of writing (May, 1994).

Blue Box revenues of \$26/tonne are based on average Durham revenues for 1992, which were confirmed by Regional staff at \$543,000 for 21,000 tonnes handled at the MRF.

Yard Waste Collection and Processing

Yard waste collection costs are based on information obtained from telephone conversations with staff at the Town of Whitby (Gale, 1993), and BFI, Oshawa (O'Leary, 1993), who handle yard waste collection for Newcastle and Ajax. The Town of Whitby spent \$203,328 to collect approximately 2,400 tonnes of yard waste in 1992 (Gale, 1993), which yields a unit cost of \$85/tonne. The average cost to collect yard waste for Newcastle & Ajax in 1992 was estimated at \$70/tonne. These costs were averaged to give a collection cost of \$78/tonne for yard waste.

Yard waste processing costs of \$76/tonne are based on net costs of \$769,641 to process 10,121 tonnes of leaf and yard waste in 1993 (Watson, 1994).

Other Waste Diverted

Other waste diverted would include miscellaneous materials collected at depots and transfer stations. These include wood and brush, leaves and yard waste, scrap metal, OCC, ONP, drywall, tires, waste oil, batteries, propane tanks, paint products and clean fill. A unit cost of \$188/tonne was used for other waste diverted, based on a reported cost of \$75,000 to handle 400 tonnes of materials at Oshawa Transfer Station in Durham in 1992 (Watson, 1993).

Garbage Collection

Garbage collection costs of \$45/tonne were used, based on an average value for residential waste collection for Newcastle, Ajax and Pickering. (O'Leary, 1993).

3.3 Residential System Costs

Detailed residential system cost estimates for Region of Durham are presented in Tables 3.2 and 3.3 and are summarized in Tables 3.4 and 3.5 for disposal rates of \$50/tonne and \$100/tonne respectively.

The estimated annual system costs (diversion plus disposal) and the system cost per household (diversion plus disposal) in the year 2000 for disposal rates of \$50 and \$100/tonne are summarized in Table 3.6.

Table 3.2
Region of Durham
Unit Costs and Cost Estimates (Diversion Plus Disposal)
Disposal \$50/tonne
Year 2000

Estimate Item No.	System Description		Blue Box Collection	Blue Box Processing	Blue Box Revenue	Yard Waste Collection	Yard Waste Processing	Backyard Composting Net	Other Waste Diverted	Garbage Collection	Garbage Disposal	MSW Processing	Wet/Dry Collection	Wet Composting
	Unit Cost (\$A)		\$103	\$162	\$26	\$78	\$76	\$45	\$188	\$45	\$50	\$105	\$77	\$80
1	Existing	tonnes cost (\$)	25,020 \$2,577,041	25,020 \$4,053,211	25,020 \$650,515	10,137 \$790,663	10,137 \$770,389	4,780 \$215,120	6,667 \$1,253,332	129,895 \$5,845,260	129,895 \$6,494,733			
2	Existing/ Committed	tonnes cost (\$)	25,982 \$2,676,193	25,982 \$4,209,159	25,982 \$675,544	15,106 \$1,178,240	15,106 \$1,148,028	5,632 \$253,449	6,667 \$1,253,332	123,112 \$5,540,044	123,112 \$6,155,604			
3	Direct Cost	tonnes cost (\$)	33,503 \$3,450,850	33,503 \$5,427,551	33,503 \$871,088	16,769 \$1,308,017	16,769 \$1,274,478	19,111 \$859,996	6,667 \$1,253,332	100,450 \$4,520,237	100,450 \$5,022,486			
4	Expanded Blue Box	tonnes cost (\$)	39,246 \$4,042,387	39,246 \$6,357,930	39,246 \$1,020,408	14,906 \$1,162,693	14,906 \$1,132,880	17,066 \$767,978	6,667 \$1,253,332	98,613 \$4,437,569	98,613 \$4,930,632			
5	Wet/Dry	tonnes cost (\$)		39,246 \$6,357,930	39,246 \$1,020,408			17,066 \$767,978	6,667 \$1,253,332		78,388 \$3,919,419		152,765 \$11,762,939	35,131 \$2,810,447
6A	Mixed Waste Processing - low quality compost	tonnes cost (\$)	25,982 \$2,676,193	25,982 \$4,209,159	38,480 \$1,000,490	15,106 \$1,178,253	15,106 \$1,148,041	15,021 \$675,960	6,667 \$1,253,332	113,723 \$5,117,515		113,723 \$11,940,869		
6B	- high quality compost	tonnes cost (\$)									71,008 \$3,550,397 40,790 \$2,039,499			

Notes:

1. Population growth factor 1992 - 2000 = 1.26
2. The housing profile has been assumed to remain as per 1992 for the material flow estimates
3. Estimates of source reduction have not been accounted for in the analysis of cost. Material flows would be reduced depending on the level of source reduction
4. Blue Box collection costs based on 1992 costs \$1,767,000 to collect 17,166 tonnes (excluding Igloos) (Watson, Region of Durham, 1993)
5. Blue Box Processing cost based on 1992 cost of \$3.4 million to process 21,000 tonnes (Watson, Region of Durham, 1993)
6. Blue Box Revenue based on \$543,000 for sale of 21,000 tonnes of materials at the Durham MRP in 1992 (Watson, Region of Durham, 1993)
7. Yard Waste collection cost based on average collection costs for Whitby, Newcastle and Ajax (Gale, Town of Whitby, 1993) (O'Leary, BPI Oshawa, 1993)
8. Yard Waste processing based on 1999 contracted price of \$76/tonne (Watson, Region of Durham 1994)
9. Other Waste Diverted cost based on \$75,000/400 tonnes (\$188/tonne - from Oshawa transfer station in Durham, 1993)
10. Garbage Collection cost of \$45/tonne based on average cost for Pickering, Ajax, and Newcastle (O'Leary, BPI Oshawa, 1993)
11. A low Garbage Disposal cost of \$50/tonne is assumed to assess sensitivity
12. Wet Processing cost based on cost for in-vessel composting facility estimated for Greater Vancouver Regional District, (CH2MHILL, Cedar Grove Compost Co., RLS, 1993)
13. Wet/Dry Collection cost based on centralized composting cost estimated for Mississauga, (Proctor & Redfern, 1994 and RLS estimate)
14. Mixed Waste Processing cost based on data from existing MSW facilities in U.S.
15. High quality compost meets MOEB compost quality guidelines; low quality compost does not meet MOEB compost quality guidelines.

Table 3.3
Region of Durham
Unit Costs and Cost Estimates (Diversion Plus Disposal)
Disposal \$100/tonne
Year 2000

Waste Stream	System Description	Unit Cost (\$/t)	Blue Box Collection	Blue Box Processing	Blue Box Revenue	Yard Waste Collection	Yard Waste Processing	Backyard Composting	Other Waste Diverted	Garbage Collection	Garbage Disposal	MSW Processing	Wet/Dry Collection	Wet/Dry Composting
			\$103	\$162	\$26	\$78	\$76	\$45	\$188	\$45	\$100	\$105	\$77	\$80
1	Existing	tonnes cost (\$)	25,020 \$2,577,041	25,020 \$4,053,211	25,020 \$650,515	10,137 \$790,663	10,137 \$770,389	4,780 \$215,120	6,667 \$1,253,332	129,895 \$5,845,260	129,895 \$12,989,466			
2	Existing/ Committed	tonnes cost (\$)	25,982 \$2,676,193	25,982 \$4,209,159	25,982 \$675,544	15,106 \$1,178,240	15,106 \$1,148,028	5,632 \$253,449	6,667 \$1,253,332	123,112 \$5,540,044	123,112 \$12,311,208			
3	Direct Cost	tonnes cost (\$)	33,503 \$3,450,850	33,503 \$5,427,551	33,503 \$871,088	16,769 \$1,308,017	16,769 \$1,274,478	19,111 \$859,996	6,667 \$1,253,332	100,450 \$4,520,237	100,450 \$10,044,972			
4	Expanded Blue Box	tonnes cost (\$)	39,246 \$4,042,387	39,246 \$6,357,930	39,246 \$1,020,408	14,906 \$1,162,693	14,906 \$1,132,880	17,066 \$767,978	6,667 \$1,253,332	98,613 \$4,437,569	98,613 \$9,861,264			
5	Wet/Dry	tonnes cost (\$)		39,246 \$6,357,930	39,246 \$1,020,408			17,066 \$767,978	6,667 \$1,253,332		78,388 \$7,838,838		152,765 \$11,762,939	35,131 \$2,810,447
6A	Mixed Waste Processing - low quality compost	tonnes cost (\$)	25,982 \$2,676,193	25,982 \$4,209,159	38,480 \$1,000,490	15,106 \$1,178,253	15,106 \$1,148,041	15,021 \$675,960	6,667 \$1,253,332	113,723 \$5,117,515		113,723 \$11,940,869		
6B	- high quality compost	tonnes cost (\$)									71,008 \$7,100,793 40,790 \$4,078,998			

Notes:

- Population growth factor 1992 - 2000 = 1.26
- The housing profile has been assumed to remain as per 1992 for the material flow estimates
- Estimates of source reduction have not been accounted for in the analysis of cost. Material flows would be reduced depending on the level of source reduction
- Blue Box collection costs based on 1992 costs \$1,767,000 to collect 17,166 tonnes (excluding Igloos) (Watson, Region of Durham, 1993)
- Blue Box Processing cost based on 1992 cost of \$3.4 million to process 21,000 tonnes (Watson, Region of Durham, 1993)
- Blue Box Revenue based on \$543,000 for sale of 21,000 tonnes of materials at the Durham MRF in 1992 (Watson, Region of Durham, 1993)
- Yard Waste collection cost based on average collection costs for Whitby, Newcastle and Ajax (Gale, Town of Whitby, 1993) (O'Leary, BFI Oshawa, 1993)
- Yard Waste processing based on 1993 contracted price of \$76/tonne (Watson, Region of Durham 1994)
- Other Waste Diverted cost based on \$75,000/400 tonnes (\$188/tonne - from Oshawa transfer station in Durham, 1993)
- Garbage Collection cost of \$45/tonne based on average cost for Pickering, Ajax, and Newcastle (O'Leary, BFI Oshawa, 1993)
- A high Garbage Disposal cost of \$100/tonne is assumed to assess sensitivity
- Wet Processing cost based on cost for in-vessel composting facility estimated for Greater Vancouver Regional District, (CH2MHILL, Cedar Grove Compost Co., RIS, 1993)
- Wet/Dry Collection cost based on centralized composting cost estimated for Mississauga, (Proctor & Redfern, 1994 and RIS estimate)
- Mixed Waste Processing cost based on data from existing MSW facilities in U.S.
- High quality compost meets MOEB compost quality guidelines; low quality compost does not meet MOEB compost quality guidelines.

Table 3.4
Region of Durham
Summary of Residential System Costs (Diversion Plus Disposal)
Disposal \$50/tonne
Year 2000

Residential System	System	Households (2000)	Diversion System Costs			Disposal System Costs			Total System Cost	Diversion System Costs		Total System Cost (2000)
			Collection	Processing	Total	Collection	Disposal	Total		System (2000)	Waste (2000)	
1	Existing	26	\$3,367,704	\$5,641,537	\$9,009,241	\$5,845,260	\$6,494,733	\$12,339,993	\$21,349,233	\$193	\$49	\$117
2	Existing/ Committed	30	\$3,854,433	\$6,188,424	\$10,042,857	\$5,540,044	\$6,155,604	\$11,695,648	\$21,738,505	\$188	\$55	\$119
3	Direct Cost	43	\$4,758,867	\$7,944,268	\$12,703,135	\$4,520,237	\$5,022,486	\$9,542,723	\$22,245,859	\$167	\$70	\$122
4	Expanded Blue Box	44	\$5,205,080	\$8,491,711	\$13,696,792	\$4,437,569	\$4,930,632	\$9,368,201	\$23,064,992	\$176	\$75	\$126
5	Wet/Dry	56	\$5,727,034	\$10,169,278	\$15,896,312	\$6,035,905	\$3,919,419	\$9,955,324	\$25,851,636	\$162	\$87	\$142
6A	Mixed Waste Processing	60 - 77	\$7,143,473	\$18,226,870	\$25,370,343	\$3,195,357	\$3,550,397	\$6,745,753	\$32,116,096	\$240	\$139	\$176
6B			\$9,470,255	\$18,226,870	\$27,697,125	\$1,835,549	\$2,039,499	\$3,875,048	\$31,572,173	\$204	\$152	\$173

Notes:

1. The projected total households has been used for determining cost per household.

2. Estimated costs include revenues from sale of recyclables.

No. of Households (2000) =

182,336

Table 3.5
Region of Durham
Summary of Residential System Costs (Diversion Plus Disposal)
Disposal \$100/tonne
Year 2000

System	System Description	Households (000)	Diversion System Costs			Disposal System Costs			System Cost	Diversion System Costs		Total
			Collection	Processing	Total	Collection	Processing	Total		Collection	Processing	
1	Existing	26	\$3,367,704	\$5,641,537	\$9,009,241	\$5,845,260	\$12,989,466	\$18,834,726	\$27,843,966	\$193	\$49	\$153
2	Existing/ Committed	30	\$3,854,433	\$6,188,424	\$10,042,857	\$5,540,044	\$12,311,208	\$17,851,252	\$27,894,109	\$188	\$55	\$153
3	Direct Cost	43	\$4,758,867	\$7,944,268	\$12,703,135	\$4,520,237	\$10,044,972	\$14,565,209	\$27,268,345	\$167	\$70	\$150
4	Expanded Blue Box	44	\$5,205,080	\$8,491,711	\$13,696,792	\$4,437,569	\$9,861,264	\$14,298,833	\$27,995,624	\$176	\$75	\$154
5	Wet/Dry	56	\$5,727,034	\$10,169,278	\$15,896,312	\$6,035,905	\$7,838,838	\$13,874,743	\$29,771,055	\$162	\$87	\$163
6A	Mixed Waste Processing	60 - 77	\$7,143,473	\$18,226,870	\$25,370,343	\$3,195,357	\$7,100,793	\$10,296,150	\$35,666,493	\$240	\$139	\$196
6B			\$9,470,255	\$18,226,870	\$27,697,125	\$1,835,549	\$4,078,998	\$5,914,547	\$33,611,672	\$204	\$152	\$184

Notes:

1. The projected total households has been used for determining cost per household.

2. Estimated costs include revenues from sale of recyclables.

No. of Households (2000) = 182,336

Table 3.6
Region of Durham
Summary of Residential System Costs (Diversion Plus Disposal)

Residential System #	System Description	ANNUAL SYSTEM COSTS (DIVERSION + DISPOSAL) IN YEAR 2000			
		\$50/tonne disposal		\$100/tonne disposal	
		\$million	\$/hh	\$million	\$/hh
1	Existing	21.3	117	27.8	153
2	Existing/Committed	21.7	119	27.9	153
3	Direct Cost	22.2	122	27.3	150
4	Expanded Blue Box	23.0	126	28.0	154
5	Wet/Dry	25.9	142	29.8	163
6A	Mixed Waste – Low Quality Compost	32.1	176	35.7	196
6B	Mixed Waste – High Quality Compost	31.6	173	33.6	184
Residential system cost per household is estimated as total system cost (diversion plus disposal) divided by total households in region (single-family detached, semi and low rise, and high rise) in the year 2000.					

3.4 References

Future Urban Research, *GTA 3Rs Analysis, Municipal Finance Technical Appendix*, 1994.

Personal Communications and Comments

Egli, P. Region of Durham Finance Department, 1993. Personal communication, July 1993.

Gale, M. Town of Whitby, 1993. Personal communication, June 1993.

O'Leary, D., BFI Oshawa. 1993. Personal communication, June 1993.

Watson, P. Region of Durham, 1993. Personal communication, June 1993.

4.0 METROPOLITAN TORONTO RESIDENTIAL SYSTEM COST ESTIMATES

The capital and operating cost estimates for the six Metro Toronto residential systems are discussed in this chapter. Schedule A lists the components of the IC&I systems for the GTA. The system development process is described in Section 5 of the EA Input Document and Section 3 of the Service Technical Appendix.

Schedule A of this Appendix lists the components of the residential systems. Components italicized in the Existing and Existing/Committed Systems are those components which must be added to provide the same level of 3Rs service throughout the study period (to accommodate projected population increases). Components italicized in Systems 3 to 6 are the components which have been added to the Existing/Committed System which is the base for systems development.

4.1 Capital Costs

Capital costs for the six residential systems in Metro Toronto are presented in Table 4.1. These are discussed by system below.

System 1 — Existing

The Existing System in Metro Toronto processes approximately 100,000 tonnes/year in the 3 existing MRFs (QUNO, CRInc and Dufferin Street). However, an additional 20,600 tonnes/year capacity will be required by the Existing System by 2015. It was assumed for this analysis that a new MRF at an estimated capital cost of \$6,500,000 and capacity of approximately 20,600 tonnes/year would be required to meet the needs of the study period.

Metro Toronto had distributed 105,000 backyard composters by the end of 1992. This equated to 23.4% coverage of all single-family households. An additional 9,800 backyard composters at a cost of \$590,000 would need to be distributed by the year 2000 to maintain the same coverage level.

Total Capital Cost: \$7,090,000

System 2 — Existing/Committed

The 5 year capital commitments contained in the most recent Metro Toronto Capital Budget (1994 - 1998) for waste diversion total approximately \$6,307,000 and include the following:

- \$500,000 for leaf and yard waste bunkers;
- \$2,423,000 for MRF improvements (glass handling);
- \$1,900,000 for leaf and yard waste composting improvements;
- \$1,386,000 for miscellaneous recycling projects; and
- \$98,000 for wood shredding.

It has been assumed for this analysis that a new MRF would be constructed at a cost of \$9,100,000 to process the additional 36,600 tonnes of dry materials recovered by the Existing/Committed System in the year 2015.

Table 4.1
Metropolitan Toronto
Capital Costs for Residential Systems (Diversion Plus Disposal)

System 1 Existing	System 2 Existing/Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6 Mixed Waste Processing
\$6,500,000 for new MRF (20,600 t/yr) \$590,000 for 9,800 byc to maintain 23.4% coverage of single-family households	\$500,000 leaf and yard waste bunkers (1994 capital budget) \$2,423,000 MRF improvements (1994 capital budget) \$1,900,000 leaf and yard waste composting improvements (1994 capital budget) \$1,386,000 misc. recycling projects (1994 capital budget) \$98,000 wood shredding (1994 capital budget) \$9,100,000 for new MRF (36,600 tonnes/year) \$609,000 for 10,150 byc to provide 27.5% coverage of single-family households	\$16,100,000 for 1 MRF @ 95,000 tonnes/year \$15,450,000 for 257,500 byc for 80% coverage of single-family households by year 2000 \$500,000 leaf and yard waste bunkers (1994 capital budget) \$2,423,000 MRF improvements (1994 capital budget) \$1,900,000 leaf and yard waste composting improvements (1994 capital budget) \$1,386,000 misc. recycling projects (1994 capital budget) \$98,000 wood shredding (1994 capital budget)	\$20,900,000 for 1 MRF @ 147,000 tonnes/year \$15,450,000 for 257,500 byc for 80% coverage of single-family households by year 2000 \$500,000 leaf and yard waste bunkers (1994 capital budget) \$2,423,000 MRF improvements (1994 capital budget) \$1,900,000 leaf and yard waste composting improvements (1994 capital budget) \$1,386,000 misc. recycling projects (1994 capital budget) \$98,000 wood shredding (1994 capital budget)	\$20,900,000 for 1 MRF @ 147,000 tonnes/year \$15,450,000 for 257,500 byc for 80% coverage of single-family households by year 2000 \$49,080,000 for 490,800 household carts \$50,000,000 for 242,000 t/year central composting facility \$500,000 leaf and yard waste bunkers (1994 capital budget) \$2,423,000 MRF improvements (1994 capital budget) \$1,900,000 leaf and yard waste composting improvements (1994 capital budget) \$1,386,000 misc. recycling projects (1994 capital budget) \$98,000 wood shredding (1994 capital budget)	\$9,100,000 for new MRF (36,600 tonnes/year) \$15,450,000 for 257,500 byc for 80% coverage of single-family households by year 2000 \$249,000,000 for two mixed waste processing and composting plants @ 467,000 tonnes/year each \$500,000 leaf and yard waste bunkers (1994 capital budget) \$2,423,000 MRF improvements (1994 capital budget) \$1,900,000 leaf and yard waste composting improvements (1994 capital budget) \$1,386,000 misc. recycling projects (1994 capital budget) \$98,000 wood shredding (1994 capital budget)
Total capital cost \$7,090,000	Total capital cost \$16,025,000	Total capital cost: \$37,866,000 Revenues: \$51,000,000/year in year 2000	Total capital cost \$42,666,000	Total capital costs \$141,746,000	Total capital cost \$279,866,000

- Notes:**
- All values in \$1992
 - Facilities sized for processing requirements in year 2015
 - "byc" refers to backyard composters
 - Costs for backyard composters, and household carts (for wet/dry system) shown to service number of households in the Year 2000
 - Direct cost revenues shown for year 2000
 - All MRFs sized and costed to run at 2 shifts/day, 250 d/year in the year 2015, one new MRF for each Region for each system
 - Central composting and mixed waste processing and composting plants sized to run 250 days/year, with capacity to process tonnes generated in year 2015

The Region had distributed 125,000 backyard composters by the end of 1993, providing coverage of 27.5% of all single-family households. An additional 10,150 backyard composters would be required (at a cost of \$609,000) to maintain this coverage level in the year 2000.

Total Capital Cost: \$16,025,000

System 3 — Direct Cost

Capital

The Direct Cost system would recover and process 95,000 tonnes/year of dry material by the year 2015, therefore, one new MRF would be required to meet this need at a cost of \$16,100,000.

Metro Toronto will have 490,796 single-family households by the year 2000. To provide coverage to 80% of single family households, 392,637 backyard composters need to be in place by the year 2000. As 125,000 backyard composters were in place in 1993, purchase of approximately 257,500 additional backyard composters at a cost of approximately \$15,450,000 (\$60/composter) would be required.

Revenues

Direct Cost system revenues in the year 2000 would be \$51,000,000.

Total Capital Cost: \$37,866,000
Revenues (Year 2000): \$51,000,000

System 4 — Expanded Blue Box

Capital costs for the Expanded Blue Box system consist of:

- \$6,307,000 from the Existing/Committed system;
- \$20,900,000 for 1 MRF operating at 147,000 tonnes/year; and
- \$15,450,000 for 257,500 backyard composters (see explanation in System 3 - Direct Cost).

Total Capital Cost: \$42,666,000

System 5 — Wet/Dry

The capital costs of the Wet/Dry system include:

- \$6,307,000 capital commitments from the Existing/Committed system;
- \$20,900,000 for 1 MRF operating at 147,000 tonnes/year;
- \$15,450,000 for 257,500 backyard composters by the year 2000;
- \$49,080,000 to provide roll-out carts to 490,800 single-family households by the year 2000;
- \$50,000,000 for a central composting facility with a capacity of 242,000 tonnes/year.

Total Capital Cost: \$141,746,000

System 6 — Mixed Waste Processing

The mixed waste processing and composting plant capacity required for Metro Toronto would be approximately 934,000 tonnes/year. Because of its size, this capacity would likely be broken into two plants. For the purposes of this analysis two plants have been assumed, each with a capacity of 467,000 tonnes/year (1,868 tonnes/day). Capital costs of the Mixed Waste Processing system are therefore:

- \$6,307,000 capital commitments from the Existing/Committed system;
- \$9,100,000 for new MRF operating at 36,600 tonnes/year;
- \$17,700,000 for 257,500 backyard composters;
- \$249,000,000 for 2 mixed waste processing and composting plants, each with a capacity of 467,000 tonnes/year.

Total Capital Cost: \$279,866,000

4.2 Operating Costs

Blue Box Collection and Processing

A Blue Box collection and processing cost of \$199/tonne was provided in Metro's 1992 Annual Report. Metro staff confirmed an allocation of \$161/tonne for collection, and \$38/tonne for processing, with revenues of \$12/tonne. (Pollock, Michael, Nanda, June 1993).

Yard Waste Collection and Processing

Yard waste collection costs were taken from an AMRC report and were based on the \$74/tonne collection cost reported by Etobicoke for collection of bagged leaf and yard waste. (ORTECH International, 1993). Metro Toronto staff confirmed that this rate was reasonable to apply Metro-wide.

Yard waste processing costs of \$55/tonne were taken from the AMRC report and were based on an allowance of \$33/tonne for operation of an open windrow site, and \$22/tonne for capital costs (for Waterloo, Ontario).

Garbage Collection and Disposal

Garbage collection costs of \$60/tonne were used, based on Metro Toronto costs. (Metropolitan Toronto Commissioner of Works, 1992).

Other Waste Diverted

Other waste diverted would include miscellaneous materials collected at depots and transfer stations. These include wood and brush, leaves and yard waste, scrap metal, OCC, ONP, drywall, tires, waste oil, batteries, propane tanks, paint products and clean fill. Metro staff considered the unit rate of \$188/tonne reported by Region of Durham staff (Watson, 1993) for management of other material to be reasonable.

4.3 System Costs

System cost estimates are presented in detail in Tables 4.2 and 4.3, and are summarized in Tables 4.4 and 4.5 for disposal rates of \$50/tonne and \$100/tonne respectively.

Table 4.2
Metropolitan Toronto
Unit Costs and Cost Estimates (Diversion Plus Disposal)
Disposal \$50/tonne
Year 2000

			Blue Box Collection	Blue Box Processing	Blue Box Revenue	Yard Waste Collection	Yard Waste Processing	Backyard Composting Net	Other Waste Diverted	Garbage Collection	Garbage Disposal	MSW Processing	Wet/Dry Collection	Wet Composting
	Unit Cost	(\$/t)	\$161	\$38	\$12	\$74	\$55	\$45	\$188	\$60	\$50	\$88	\$77	\$62
1	Existing	tonnes cost (\$)	111,452 \$17,943,812	111,452 \$4,235,186	111,452 \$1,337,427	74,615 \$5,521,517	74,615 \$4,103,831	18,632 \$838,451	6,536 \$1,228,815	912,044 \$54,722,619	912,044 \$45,602,183			
2	Existing/ Committed	tonnes cost (\$)	126,250 \$20,326,234	126,250 \$4,797,496	126,250 \$1,514,999	78,540 \$5,811,960	78,540 \$4,319,700	21,738 \$978,193	6,420 \$1,206,904	890,333 \$53,419,968	890,333 \$44,516,640			
3	Direct Cost	tonnes cost (\$)	180,199 \$29,012,023	180,199 \$6,847,558	180,199 \$2,162,387	73,489 \$5,438,175	73,489 \$4,041,886	69,313 \$3,119,067	6,420 \$1,206,904	793,860 \$47,631,591	793,860 \$39,692,993			
4	Expanded Blue Box	tonnes cost (\$)	228,103 \$36,724,591	228,103 \$8,667,916	228,103 \$2,737,237	69,227 \$5,122,778	69,227 \$3,807,470	62,957 \$2,833,080	9,170 \$1,723,894	753,822 \$45,229,338	753,822 \$37,691,115			
5	Wet/Dry	tonnes cost (\$)		228,103 \$8,667,916	228,103 \$2,737,237			62,957 \$2,833,080	9,170 \$1,723,894		631,323 \$31,566,150		1,051,151 \$80,938,664	191,725 \$11,886,976
6A	Mixed Waste Processing - low quality compost	tonnes cost (\$)	126,250 \$20,326,234	126,250 \$4,797,496	233,961 \$2,807,532	71,260 \$5,273,271	71,260 \$3,919,323	56,602 \$2,547,092	6,420 \$1,206,904	862,748 \$51,764,895		862,748 \$75,921,846		
6B	- high quality compost	tonnes cost (\$)									534,129 \$26,706,435 313,220 \$15,661,013			

Notes:

1. Population growth factor 1992 - 2000 = 1.05
2. The housing profile has been assumed to remain as per 1992 for the material flow estimates
3. Estimates of source reduction have not been accounted for in the analysis of cost. Material flows would be reduced depending on the level of source reduction
4. Blue Box costs taken from 1992 Annual Report. Total Gross Cost of Blue Box program is \$199/tonne, split \$161/tonne collection, \$38/tonne processing.
5. Blue Box revenue is \$12/tonne, taken from 1992 Annual Report.
6. Yard Waste collection cost based on Babiak's cost of \$74/tonne for bagged leaf and yard waste (Ortech International, 1993).
7. Yard Waste processing based on \$22/tonne capital, \$33/tonne operating (for Waterloo, Ontario; Ortech International, 1993)
8. Other Waste Diverted cost based on \$75,000/400 tonnes (\$188/tonne - from Oshawa transfer station in Durham) (Watson, 1993)
9. Garbage Collection cost provided by Metropolitan Toronto Commissioner of Works (1992)
10. A low Garbage Disposal cost of \$50/tonne is assumed to assess sensitivity
11. Wet Processing cost based on cost for in-vessel composting facility estimated for Greater Vancouver Regional District, (CH2MHILL, Cedar Grove Compost Co., R15, 1993)
12. Wet/Dry Collection cost based on controlled composting cost estimated for Mississauga, (Proctor & Redfern, 1994)
13. Mixed Waste Processing cost based on data from existing MSW facilities in U.S.
14. High quality compost meets MOEE compost quality guidelines; low quality compost does not meet MOEE compost quality guidelines.

Table 4.3
Metropolitan Toronto
Unit Costs and Cost Estimates (Diversion Plus Disposal)
Disposal \$100/tonne
Year 2000

Item	System Description	Unit	Blue Box Collection	Blue Box Processing	Blue Box Revenue	Yard Waste Collection	Yard Waste Processing	Backyard Composting	Other Waste Diverted	Garbage Collection	Garbage Disposal	MSW Processing	Wet/Dry Collection	Wet Composting
		Cost (\$)	\$161	\$38	\$12	\$74	\$55	\$45	\$188	\$60	\$100	\$88	\$77	\$62
1	Existing	tonnes cost (\$)	111,452 \$17,943,812	111,452 \$4,235,186	111,452 \$1,337,427	74,615 \$5,521,517	74,615 \$4,103,831	18,632 \$838,451	6,536 \$1,228,815	912,044 \$54,722,619	912,044 \$91,204,365			
2	Existing/ Committed	tonnes cost (\$)	126,250 \$20,326,234	126,250 \$4,797,496	126,250 \$1,514,999	78,540 \$5,811,960	78,540 \$4,319,700	21,738 \$978,193	6,420 \$1,206,904	890,333 \$53,419,968	890,333 \$89,033,280			
3	Direct Cost	tonnes cost (\$)	180,199 \$29,012,023	180,199 \$6,847,558	180,199 \$2,162,387	73,489 \$5,438,175	73,489 \$4,041,886	69,313 \$3,119,067	6,420 \$1,206,904	793,860 \$47,631,591	793,860 \$79,385,985			
4	Expanded Blue Box	tonnes cost (\$)	228,103 \$36,724,591	228,103 \$8,667,916	228,103 \$2,737,237	69,227 \$5,122,778	69,227 \$3,807,470	62,957 \$2,833,080	9,170 \$1,723,894	753,822 \$45,229,338	753,822 \$75,382,230			
5	Wet/Dry	tonnes cost (\$)		228,103 \$8,667,916	228,103 \$2,737,237			62,957 \$2,833,080	9,170 \$1,723,894		631,323 \$63,132,300		1,051,151 \$80,938,664	191,725 \$11,886,976
6A	Mixed Waste Processing - low quality compost	tonnes cost (\$)	126,250 \$20,326,234	126,250 \$4,797,496	233,961 \$2,807,532	71,260 \$5,273,271	71,260 \$3,919,323	56,602 \$2,547,092	6,420 \$1,206,904	862,748 \$51,764,895		862,748 \$75,921,846		
6B	- high quality compost	tonnes cost (\$)									534,129 \$53,412,870 313,220 \$31,322,025			

Notes:

1. Population growth factor 1992 - 2000 = 1.05
2. The housing profile has been assumed to remain as per 1992 for the material flow estimates
3. Estimates of source reduction have not been accounted for in the analysis of cost. Material flows would be reduced depending on the level of source reduction
4. Blue Box costs taken from 1992 Annual Report. Total Gross Cost of Blue Box program is \$199/tonne, split \$161/tonne collection, \$38/tonne processing.
5. Blue Box revenue is \$12/tonne, taken from 1992 Annual Report.
6. Yard Waste collection cost based on Rhobicoke cost of \$74/tonne for bagged leaf and yard waste (Ortech International, 1993).
7. Yard Waste processing based on \$22/tonne capital, \$33/tonne operating (for Waterloo, Ontario; Ortech International, 1993)
8. Other Waste Diverted cost based on \$75,000/400 tonnes (\$188/tonne - from Oakhills transfer station in Durham) (Watson, 1993)
9. Garbage Collection cost provided by Metropolitan Toronto Commissioner of Works (1992)
10. A high Garbage Disposal cost of \$100/tonne is assumed to assess sensitivity
11. Wet Processing cost based on cost for in-vessel composting facility estimated for Greater Vancouver Regional District, (CH2MHILL, Cedar Grove Compost Co., RIS, 1993)
12. Wet/Dry Collection cost based on centralized composting cost estimated for Mississauga, (Proctor & Redfern, 1994)
13. Mixed Waste Processing cost based on data from existing MSW facilities in U.S.
14. High quality compost meets MOEE compost quality guidelines; low quality compost does not meet MOEE compost quality guidelines.

Table 4.4
Metropolitan Toronto
Summary of Residential System Costs (Diversion Plus Disposal)
Disposal \$50/tonne
Year 2000

Residential System No.	System Description	Households (000)	Diversion System Costs			Disposal System Costs			Total System Cost	Diversion System Costs		Total System Cost (\$/HH)
			Collection	Processing	Total	Collection	Disposal	Total		House Diverted	\$/HH	
1	Existing	19	\$23,465,330	\$9,068,855	\$32,534,185	\$54,722,619	\$45,602,183	\$100,324,802	\$132,858,986	\$154	\$34	\$139
2	Existing/Committed	21	\$26,138,194	\$9,787,294	\$35,925,488	\$53,419,968	\$44,516,640	\$97,936,608	\$133,862,096	\$154	\$38	\$140
3	Direct Cost	29	\$34,450,197	\$13,053,029	\$47,503,226	\$47,631,591	\$39,692,993	\$87,324,584	\$134,827,810	\$144	\$50	\$141
4	Expanded Blue Box	33	\$41,847,369	\$14,295,124	\$56,142,493	\$45,229,338	\$37,691,115	\$82,920,453	\$139,062,946	\$152	\$59	\$145
5	Wet/Dry	44	\$32,326,793	\$22,374,629	\$54,701,422	\$48,611,871	\$31,566,150	\$80,178,021	\$134,879,443	\$111	\$57	\$141
6A	Mixed Waste Processing	52 - 72	\$50,903,211	\$85,585,129	\$136,488,340	\$32,047,722	\$26,706,435	\$58,754,157	\$195,242,497	\$232	\$143	\$204
6B			\$67,913,161	\$85,585,129	\$153,498,290	\$18,793,215	\$15,661,013	\$34,454,228	\$187,952,518	\$189	\$160	\$196

Notes:

1. The projected total households has been used for determining cost per household.

2. Estimated costs include revenues from sale of recyclables.

No. of Households (2000) = 956,717

Table 4.5
Metropolitan Toronto
Summary of Residential System Costs (Diversion Plus Disposal)
Disposal \$100/tonne
Year 2000

System No.	System Description	Households (000)	Diversion System Costs			Disposal System Costs			System Cost	Diversion System Costs		System Cost
			Collection	Processing	Total	Collection	Disposal	Total		Waste Diverted	\$/HH	
1	Existing	19	\$23,465,330	\$9,068,855	\$32,534,185	\$54,722,619	\$91,204,365	\$145,926,984	\$178,461,169	\$154	\$34	\$187
2	Existing/ Committed	21	\$26,138,194	\$9,787,294	\$35,925,488	\$53,419,968	\$89,033,280	\$142,453,248	\$178,378,736	\$154	\$38	\$186
3	Direct Cost	29	\$34,450,197	\$13,053,029	\$47,503,226	\$47,631,591	\$79,385,985	\$127,017,576	\$174,520,802	\$144	\$50	\$182
4	Expanded Blue Box	33	\$41,847,369	\$14,295,124	\$56,142,493	\$45,229,338	\$75,382,230	\$120,611,568	\$176,754,061	\$152	\$59	\$185
5	Wet/Dry	44	\$32,326,793	\$22,374,629	\$54,701,422	\$48,611,871	\$63,132,300	\$111,744,171	\$166,445,593	\$111	\$57	\$174
6A	Mixed Waste Processing	52 - 72	\$50,903,211	\$85,585,129	\$136,488,340	\$32,047,722	\$53,412,870	\$85,460,592	\$221,948,932	\$232	\$143	\$232
6B			\$67,913,161	\$85,585,129	\$153,498,290	\$18,793,215	\$31,322,025	\$50,115,240	\$203,613,530	\$189	\$160	\$213

Notes:

1. The projected total households has been used for determining cost per household.

2. Estimated costs include revenues from sale of recyclables.

No. of Households (2000) =

956,717

The estimated annual system costs (diversion plus disposal) and the system costs per household (diversion plus disposal) in the year 2000 for disposal rates of \$50/tonne and \$100/tonne are summarized in Table 4.6.

Table 4.6
Metro Toronto
Summary of Residential System Costs (Diversion Plus Disposal)

Residential System #	System Description	ANNUAL SYSTEM COSTS (DIVERSION + DISPOSAL) IN YEAR 2000			
		\$50/tonne disposal		\$100/tonne disposal	
		\$million	\$/hh	\$million	\$/hh
1	Existing	132.9	139	178.5	187
2	Existing/Committed	133.9	140	178.4	186
3	Direct Cost	134.8	141	174.5	182
4	Expanded Blue Box	139.0	145	176.8	185
5	Wet/Dry	134.9	141	166.4	174
6A	Mixed Waste – Low Quality Compost	195.2	204	221.9	232
6B	Mixed Waste – High Quality Compost	188.0	196	203.6	213

4.4 References

Future Urban Research, *GTA 3Rs Analysis, Municipal Finance Technical Appendix*, 1994.

Metropolitan Toronto Works Department, 1993. Summary of the 1994-1998 Capital Program Review-Solid Waste Management Division, December 1993.

Metropolitan Toronto Commissioner of Works. 1992. *Memorandum: Preliminary Financial Analysis of the Blue Box Program*. (February 27). Prepared for the Metropolitan Toronto Works Committee.

Metropolitan Toronto Works Department, 1992. *Annual Report*.

Ortech International. 1993. *AMRC Leaf and Yard Waste Composting Study*. Prepared for the Association for Municipal Recycling Co-ordinators.

Personal Communications and Comments

Michael, T. Metro Works Department, 1993 Personal communication, June 1993.

Nanda, A. Metro Works Department, 1993. Personal communication, June 1993.

Pollock A. Metro Works Department, 1993 Personal communication, June 1993.

Watson, P., Region of Durham. 1993. Personal communication, June 1993.

5.0 REGION OF YORK RESIDENTIAL SYSTEM COST ESTIMATES

The capital and operating costs of the six Region of York residential systems are discussed in this chapter. Schedule A lists the components of the IC&I systems for the GTA. The system development process is described in Section 5 of the EA Input Document and Section 3 of the Service Technical Appendix.

Schedule A of this Appendix lists the components of the residential systems. Components italicized in the Existing and Existing/Committed Systems are those components which must be added to provide the same level of 3Rs service throughout the study period (to accommodate projected population increases). Components italicized in Systems 3 to 6 are the components which have been added to the Existing/Committed System which is the base for systems development.

5.1 Capital Costs

Estimated capital costs for the six residential systems of the Region of York are presented in Table 5.1. These are discussed by system below.

System 1 — Existing

It is assumed for this analysis that Region of York would require a new MRF, with capacity of 51,000 tonnes/year, to meet requirements of the Existing System in the year 2015, at a capital cost of \$11,100,000.

Region of York had distributed 29,050 backyard composters by the end of 1992. This provided 20.2% coverage of all single-family households. An additional 10,600 backyard composters would need to be distributed by the year 2000 to maintain the same coverage level, at a capital cost of \$633,000.

Total Capital Cost: \$11,733,000.

System 2 — Existing/Committed

The 5 year funding commitments for Region of York are (Future Urban Research, 1994):

- \$561,100 for miscellaneous improvements;
- \$2,224,000 for a Regional MRF (operational in 1994).

In addition, the Existing/Committed system would require:

- \$568,000 for 9,500 backyard composters to maintain an 19.6% coverage rate of single-family households by the year 2000;
- \$11,500,000 for a new MRF to process 55,000 tonnes/year by the year 2015;

Total Capital Cost: \$14,853,000

System 3 — Direct Cost

Capital

The Direct Cost system includes commitments from the 1993-1997 capital budget. The Direct Cost system would require a new MRF with a capacity of 77,000 tonnes/year at a cost of \$14,200,000.

Table 5.1
Region of York
Capital Costs for Residential Systems (Diversion Plus Disposal)

System 1 Existing	System 2 Backyard Composting	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6 Mixed Waste Processing
\$633,000 for 10,600 byc, to maintain 20.2% coverage of single-family households \$11,100,000 new MRF (\$1,000 t/year)	\$2,224,000 new MRF (1993 capital budget) \$561,100 misc improvements (1993 capital budget) \$568,000 for 9,500 byc, to maintain 19.6% coverage of single-family households \$11,500,000 new MRF (\$5,000 t/year)	\$14,200,000 for new MRF (77,000 tonnes/year) \$7,105,000 for 118,400 byc, to reach 80% coverage of single-family homes by the year 2000 \$2,224,000 new MRF (1993 capital budget) \$561,000 misc. improvements (1993 capital budget)	\$15,400,000 for new MRF @ 88,600 tonnes/year \$7,105,000 for 118,400 byc, to reach 80% coverage of single-family homes by the year 2000 \$2,224,000 new MRF (1993 capital budget) \$561,000 misc. improvements (1993 capital budget)	\$15,400,000 for new MRF (88,600 tonnes/year) \$7,105,000 for 118,400 byc, to reach 80% coverage of single-family homes by the year 2000 \$19,616,000 for 196,160 household carts \$28,700,000 for composting plant (@97,500 tonnes per year) \$2,224,000 new MRF (1993 capital budget) \$561,000 misc. improvements (1993 capital budget)	\$11,500,000 new MRF (\$5,000 tonnes/year) \$7,105,000 for 118,400 byc, to reach 80% coverage of single-family homes by the year 2000 \$85,300,000 for 248,000 tonne/year mixed waste processing and composting plant \$2,224,000 new MRF (1993 capital budget) \$561,000 misc. improvements (1993 capital budget)
Total capital cost \$11,733,000	Total capital cost \$14,853,000	Total capital cost: \$24,090,000 Revenues: \$20,400,000/year in year 2000	Total capital cost \$25,290,000	Total capital costs \$73,606,000	Total capital cost \$106,690,000
Notes: <ul style="list-style-type: none"> • All values in \$1992 • Facilities sized for processing requirements in year 2015 • "byc" refers to backyard composters • Costs for backyard composters, and household carts (for wet/dry system) shown to service number of single-family households in the Year 2000 • Direct cost revenues shown for year 2000 • All MRFs sized and costed to run at 2 shifts/day, 250 d/year in the year 2015, one new MRF for each Region for each system • Central composting and mixed waste processing and composting plants sized to run 250 days/year, with capacity to process tonnes generated in year 2015 					

Region of York will have 196,158 single-family households by the year 2000. To provide coverage to 80% of single family households, 156,926 backyard composters need to be in place by the year 2000. Purchase of approximately 118,400 additional backyard composters would be required at a cost of approximately \$7,105,000 (\$60/composter).

Revenues

Direct Cost system revenues in the year 2000 would be approximately \$20,400,000/year.

Total Capital Cost: \$24,090,000
Revenues (Year 2000): \$20,400,000

System 4 — Expanded Blue Box

Capital costs for the Expanded Blue Box System include:

- \$11,400,000 for a new MRF to process 88,600 tonnes/year;
- \$2,785,100 for miscellaneous commitments in the capital budget; and
- \$7,105,000 for 118,400 backyard composters (see System 3 for rationale).

Total Capital Cost: \$25,290,000

System 5 — Wet/Dry System

The capital costs of the Wet/Dry System include:

- \$15,400,000 for a new MRF to process 88,600 tonnes/year;
- \$2,785,100 for miscellaneous commitments noted in the capital budget;
- \$7,105,000 for 118,400 backyard composters by the year 2000;
- \$19,616,000 to provide roll-out carts to 196,160 single-family households by the year 2000; and
- \$28,700,000 for an 97,500 tonne/year central composting facility.

Total Capital Cost: \$73,606,000

System 6 — Mixed Waste Processing

Capital costs of the Mixed Waste Processing System include:

- \$11,500,000 for a new MRF to process 55,000 tonnes/year;
- \$7,105,000 for 118,400 backyard composters;
- \$2,785,100 for miscellaneous commitments noted in the capital budget; and
- \$85,300,000 for a mixed waste processing and composting plant with 248,000 tonnes/year capacity.

Total Capital Cost: \$106,690,000

5.2 Unit Operating Costs

Blue Box Collection, Processing and Revenue

Blue Box collection costs of \$76/tonne, Blue Box processing costs of \$63/tonne, and Blue Box revenues of \$27/tonne were suggested by Region of York. (Flewelling, J., MacMillan, L, 1993) at a meeting held on June 22, 1993. The Blue Box collection cost of \$76/tonne was based on Richmond Hill's 1992 cost of \$319,000 to collect approximately 4,200 tonnes of recyclables. The Blue Box processing cost was based on Richmond Hill's cost of \$261,300 to process 4,200 tonnes of material in 1992 (including truck rental).

Yard Waste Collection and Processing

Yard waste collection costs of \$66/tonne were based on \$129,933 to collect approximately 1967 tonnes of yard waste in Richmond Hill in 1992 (Commidge, R, 1993). Region of York staff agreed with the yard waste collection rate and recommended that the highest rate for yard waste composting quoted in the Regional contract current at that time (\$59/tonne) be used for estimates.

Other Waste Diverted

Other waste diverted includes miscellaneous materials collected at depots and transfer stations, such as wood and brush, leaves and yard waste, scrap metal, OCC, ONP, drywall, tires, waste oil, batteries, propane tanks, paint products and clean fill. A unit cost of \$188/tonne was used for other waste diverted, based on a reported cost of \$75,000 to handle 400 tonnes of materials at Oshawa Transfer Station in Durham in 1992 (Watson, 1993).

Garbage Collection and Disposal

Garbage collection costs of \$60/tonne were originally used by the study team, based on data for Newmarket for 1992 (\$17.95 per capita by 45,500 residents divided by 13,900 tonnes collected). Region of York staff suggested a rate of \$54/tonne for garbage collection, based on quoted rates for East Gwillimbury.

5.3 System Costs

Detailed residential system cost estimates are presented in Tables 5.2 and 5.3 and are summarized in Tables 5.4 and 5.5 for disposal rates of \$50/tonne and \$100/tonne respectively. The estimated annual system costs (diversion plus disposal) and the system cost per household (diversion plus disposal) in the year 2000 for disposal rates of \$50/tonne and \$100/tonne are summarized in Table 5.6.

Table 5.2
Region of York
Unit Costs and Cost Estimates (Diversion Plus Disposal)
Disposal \$50/tonne
Year 2000

			Blue Box Collection	Blue Box Processing	Blue Box Transfer	Yard Waste Collection	Yard Waste Processing	Backyard Composting	Other Waste Diverted	Garbage Collection	Garbage Transfer	Low Quality Compost	Wet/Dry Transfer	High Quality Compost
	Unit Cost	(\$/t)	\$76	\$63	\$27	\$66	\$39	\$43	\$188	\$34	\$30	\$98	\$77	\$74
1	Existing	tonnes cost (\$)	36,187 \$2,750,193	36,187 \$2,279,765	36,187 \$977,042	22,005 \$1,452,330	22,005 \$1,298,295	6,628 \$298,249	8,217 \$1,544,881	191,903 \$10,362,735	191,903 \$9,595,125			
2	Existing/ Committed	tonnes cost (\$)	38,679 \$2,939,593	38,679 \$2,436,768	38,679 \$1,044,329	23,401 \$1,544,457	23,401 \$1,380,651	6,628 \$298,249	8,217 \$1,544,881	188,013 \$10,152,710	188,013 \$9,400,658			
3	Direct Cost	tonnes cost (\$)	54,660 \$4,154,171	54,660 \$3,443,589	54,660 \$1,475,824	27,586 \$1,820,709	27,586 \$1,627,603	24,165 \$1,087,437	8,217 \$1,544,881	150,309 \$8,116,686	150,309 \$7,515,450			
4	Expanded Blue Box	tonnes cost (\$)	62,865 \$4,777,774	62,865 \$3,960,523	62,865 \$1,697,367	23,401 \$1,544,455	23,401 \$1,380,649	21,556 \$970,018	8,891 \$1,671,527	148,225 \$8,004,128	148,225 \$7,411,230			
5	Wet/Dry	tonnes cost (\$)		62,865 \$3,960,523	62,865 \$1,697,367			21,556 \$970,018	8,891 \$1,671,527		113,219 \$5,660,955		234,490 \$18,055,764	58,406 \$4,322,036
6A	Mixed Waste Processing - low quality compost	tonnes cost (\$)	38,679 \$2,939,593	38,679 \$2,436,768	59,559 \$1,608,101	23,402 \$1,544,500	23,402 \$1,380,689	18,947 \$852,598	8,217 \$1,544,881	175,694 \$9,487,498		175,694 \$17,218,051		
6B	-high quality compost	tonnes cost (\$)									107,307 \$5,365,339 59,800 \$2,989,980			

Notes:

1. Population growth factor 1992 - 2000 = 1.35
2. The housing profile has been assumed to remain as per 1992 for the material flow estimates
3. Estimates of source reduction have not been accounted for in the analysis of cost. Material flows would be reduced depending on the level of source reduction.
4. Blue Box Collection cost based on \$319,011/196 tonnes (\$76/tonne) for Richmond Hill, 1992.
5. Blue Box processing cost based on \$261,299/196 tonnes (\$62/t - processing + truck rental) for Richmond Hill. A capital cost of \$25/tonne is assumed and added to give \$87/tonne
6. Yard Waste collection cost based on \$129,933/1967 tonnes (\$66/tonne) for Richmond Hill, 1992
7. Yard Waste processing cost based on \$35/tonne for Richmond Hill
8. Other Waste Diverted cost based on \$75,000/400 tonnes (\$188/tonne - from Oshawa transfer station in Durham) (Watson, 1993)
9. Garbage Collection cost based on \$17.95/capita*45,300 people (1991 census)/13,933 tonnes (\$60/tonne - from Newmarket, 1992)
10. A Low Garbage Disposal Cost of \$50/tonne is assumed to assess sensitivity
11. Wet Processing cost based on cost for in-vessel composting facility estimated for Greater Vancouver Regional District, (CH2MHILL, Cedar Grove Compost Co., RLS, 1993)
12. Wet/Dry Collection cost based on controlled composting cost estimated for Mississauga, (Proctor & Redfern, 1994)
13. Mixed Waste Processing cost based on data from existing MSW facilities in U.S.
14. High quality compost meets MOEB compost quality guidelines; low quality compost does not meet MOEB compost quality guidelines.

Table 5.3
Region of York
Unit Costs and Cost Estimates (Diversion Plus Disposal)
Disposal \$100/tonne
Year 2000

			Blue Box	Blue Box	Blue Box	Yard Waste	Yard Waste	Backyard	Other	Garbage	Garbage	Wet/Dry	Wet/Dry	Wet/Dry
			Collection	Processing	Composting	Collection	Processing	Composting	Waste	Collection	Disposal	Collection	Disposal	Disposal
		Unit Cost (\$/t)	\$76	\$63	\$27	\$66	\$59	\$45	\$188	\$54	\$100	\$98	\$77	\$74
1	Existing	tonnes cost (\$)	36,187 \$2,750,193	36,187 \$2,279,765	36,187 \$977,042	22,005 \$1,452,330	22,005 \$1,298,295	6,628 \$298,249	8,217 \$1,544,881	191,903 \$10,362,735	191,903 \$19,190,250			
2	Existing/ Committed	tonnes cost (\$)	38,679 \$2,939,593	38,679 \$2,436,768	38,679 \$1,044,329	23,401 \$1,544,457	23,401 \$1,380,651	6,628 \$298,249	8,217 \$1,544,881	188,013 \$10,152,710	188,013 \$18,801,315			
3	Direct Cost	tonnes cost (\$)	54,660 \$4,154,171	54,660 \$3,443,589	54,660 \$1,475,824	27,586 \$1,820,709	27,586 \$1,627,603	24,165 \$1,087,437	8,217 \$1,544,881	150,309 \$8,116,686	150,309 \$15,030,900			
4	Expanded Blue Box	tonnes cost (\$)	62,865 \$4,777,774	62,865 \$3,960,523	62,865 \$1,697,367	23,401 \$1,544,455	23,401 \$1,380,649	21,556 \$970,018	8,891 \$1,671,527	148,225 \$8,004,128	148,225 \$14,822,460			
5	Wet/Dry	tonnes cost (\$)		62,865 \$3,960,523	62,865 \$1,697,367			21,556 \$970,018	8,891 \$1,671,527		113,219 \$11,321,910		234,490 \$18,055,764	58,406 \$4,322,036
6A	Mixed Waste Processing -low quality compost	tonnes cost (\$)	38,679 \$2,939,593	38,679 \$2,436,768	59,559 \$1,608,101	23,402 \$1,544,500	23,402 \$1,380,689	18,947 \$852,598	8,217 \$1,544,881	175,694 \$9,487,498		175,694 \$17,218,051		
6B	-high quality compost	tonnes cost (\$)									107,307 \$10,730,678 \$9,800 \$5,979,960			

Notes:

1. Population growth factor 1992 - 2000 = 1.35
2. The housing profile has been assumed to remain as per 1992 for the material flow estimates
3. Estimates of source reduction have not been accounted for in the analysis of cost. Material flows would be reduced depending on the level of source reduction.
4. Blue Box Collection cost based on \$319,011/4196 tonnes (\$76/tonne) for Richmond Hill, 1992
5. Blue Box processing cost based on \$261259/4196 tonnes (\$62A - processing + truck rental) for Richmond Hill. A capital cost of \$25/tonne is assumed and added to give \$87/tonne
6. Yard Waste collection cost based on \$129,933/1967 tonnes (\$66/tonne) for Richmond Hill, 1992
7. Yard Waste processing cost based on \$35/tonne for Richmond Hill
8. Other Waste Diverted cost based on \$75,000/400 tonnes (\$188/tonne - from Ottawa transfer station in Durham) (Watson, 1993)
9. Garbage Collection cost based on \$17.95/capita*45,500 people (1991 census)/13,933 tonnes (\$60/tonne - from Newmarket, 1992)
10. A high Garbage Disposal Cost of \$100/tonne is assumed to assess sensitivity
11. Wet Processing cost based on cost for in-vessel composting facility estimated for Greater Vancouver Regional District, (CH2MHILL, Cedar Grove Compost Co., RLS, 1993)
12. Wet/Dry Collection cost based on centralized composting cost estimated for Minneapolis, (Proctor & Redfern, 1994)
13. Mixed Waste Processing cost based on data from existing MSW facilities in U.S.
14. High quality compost meets MOEB compost quality guidelines; low quality compost does not meet MOEB compost quality guidelines.

Table 5.4
Region of York
Summary of Residential System Costs (Diversion Plus Disposal)
Disposal \$50/tonne
Year 2000

System	Waste	Households	Diversion System Costs			Disposal System Costs			Total System Cost	Diversion System Costs		Total System Cost
			Collection	Transfer	Total	Collection	Transfer	Total		Transfer	Disposal	
1	Existing	28	\$4,202,523	\$4,444,148	\$8,646,671	\$10,362,735	\$9,595,125	\$19,957,860	\$28,604,531	\$118	\$39	\$130
2	Existing/ Committed	29	\$4,484,050	\$4,616,219	\$9,100,269	\$10,152,710	\$9,400,658	\$19,553,368	\$28,653,637	\$118	\$41	\$130
3	Direct Cost	43	\$5,974,880	\$6,227,687	\$12,202,567	\$8,116,686	\$7,515,450	\$15,632,136	\$27,834,703	\$106	\$55	\$126
4	Expanded Blue Box	44	\$6,322,229	\$6,285,350	\$12,607,579	\$8,004,128	\$7,411,230	\$15,415,358	\$28,022,937	\$108	\$57	\$127
5	Wet/Dry	57	\$9,337,894	\$9,226,737	\$18,564,631	\$8,717,871	\$5,660,955	\$14,378,826	\$32,943,457	\$122	\$84	\$149
6A 6B	Mixed Waste Processing	59 - 77	\$9,749,940 \$13,407,992	\$21,824,886 \$21,824,886	\$31,574,826 \$35,232,878	\$5,794,566 \$3,229,178	\$5,365,339 \$2,989,980	\$11,159,905 \$6,219,158	\$42,734,730 \$41,452,036	\$200 \$172	\$143 \$160	\$194 \$188
No. of Households (2000) =										220,402		

Notes:
1. The projected total households has been used for determining cost per household.
2. Estimated costs include revenues from sale of recyclables.

Table 5.5
Region of York
Summary of Residential System Costs (Diversion Plus Disposal)
Disposal \$100/tonne
Year 2000

Residential System No.	System Description	Diversion (%)	Diversion System Costs			Disposal System Costs			Total System Cost	Diversion System Costs		Total System Cost \$/HH/yr
			Collection	Processing	Total	Collection	Disposal	Total		Waste Diverted	\$/HH/yr	
1	Existing	28	\$4,202,523	\$4,444,148	\$8,646,671	\$10,362,735	\$19,190,250	\$29,552,985	\$38,199,656	\$118	\$39	\$173
2	Existing/Committed	29	\$4,484,050	\$4,616,219	\$9,100,269	\$10,152,710	\$18,801,315	\$28,954,025	\$38,054,294	\$118	\$41	\$173
3	Direct Cost	43	\$5,974,880	\$6,227,687	\$12,202,567	\$8,116,686	\$15,030,900	\$23,147,586	\$35,350,153	\$106	\$55	\$160
4	Expanded Blue Box	44	\$6,322,229	\$6,285,350	\$12,607,579	\$8,004,128	\$14,822,460	\$22,826,588	\$35,434,167	\$108	\$57	\$161
5	Wet/Dry	57	\$9,337,894	\$9,226,737	\$18,564,631	\$8,717,871	\$11,321,910	\$20,039,781	\$38,604,412	\$122	\$84	\$175
6A	Mixed Waste Processing	59 - 77	\$9,749,940	\$21,824,886	\$31,574,826	\$5,794,566	\$10,730,678	\$16,525,243	\$48,100,069	\$200	\$143	\$218
6B			\$13,407,992	\$21,824,886	\$35,232,878	\$3,229,178	\$5,979,960	\$9,209,138	\$44,442,016	\$172	\$160	\$202

Notes:
1. The projected total households has been used for determining cost per household.
2. Estimated costs include revenues from sale of recyclables.

No. of Households (2000) = 220,402

Table 5.6
Region of York
Summary of Residential System Costs (Diversion Plus Disposal)

Residential System #	System Description	ANNUAL SYSTEM COSTS (DIVERSION + DISPOSAL) IN YEAR 2000			
		\$50/tonne disposal		\$100/tonne disposal	
		\$million	\$/hh	\$million	\$/hh
1	Existing	28.6	130	38.2	173
2	Existing/Committed	28.7	130	38.0	173
3	Direct Cost	27.8	126	35.4	160
4	Expanded Blue Box	28.0	127	35.4	161
5	Wet/Dry	32.9	149	38.6	175
6A	Mixed Waste – Low Quality Compost	42.7	194	48.1	218
6B	Mixed Waste – High Quality Compost	41.5	188	44.4	202

5.4 References

Future Urban Research, *GTA 3Rs Analysis, Municipal Finance Technical Appendix*, 1994.

Region of York, Appendix A, Report No. 21 of the Regional Transportation and Environmental Services Committee, Adopted by Region of York Council on December 10, 1992.

Personal Communications and Comments

Commidge, R. Town of Richmond Hill, 1993. Personal communication June 1993.

Flewelling, J. Region of York Works Department, 1993. Personal communication, June 1993.

MacMillan, L. Region of York Works Department, 1993. Personal communication, June 1993.

Watson, P. Region of Durham, 1993. Personal communication, June 1993.

6.0 REGION OF PEEL RESIDENTIAL SYSTEM COST ESTIMATES

The capital and operating costs for the six Peel residential systems are discussed in this chapter. Schedule A lists the components of the IC&I systems for the GTA. The system development process is described in Section 5 of the EA Input Document and Section 3 of the Service Technical Appendix.

Schedule A of this Appendix lists the components of the residential systems. Components italicized in the Existing and Existing/Committed Systems are those components which must be added to provide the same level of 3Rs service throughout the study period (to accommodate projected population increases). Components italicized in Systems 3 to 6 are the components which have been added to the Existing/Committed System which is the base for systems development.

6.1 Capital Costs

Capital costs for the six residential system in Region of Peel are presented in Table 6.1. These are discussed by system below.

System 1 — Existing

The Existing System in Peel Region would include one new MRF at a cost of \$12,100,000 to process 59,000 tonnes/year.

The Region of Peel had distributed 56,839 backyard composters by the end of 1992. This provided 33% coverage of all single-family households. An additional 17,400 backyard composters at a cost of \$1,044,000 would need to be distributed by the year 2000 to maintain the same coverage level.

Total Capital Cost: \$13,144,000.

System 2 — Existing/Committed

The 5 year funding commitments for Region of Peel are (Future Urban Research 1994):

- \$400,000 for mini recycling depots (1994 capital budget);
- \$29,000,000 for 7 community recycling centres (Cave, 1994). This is higher than the \$24,000,000 included in the Regional 1994-1998 Capital Budget, but is considered reasonable for this analysis;
- \$720,000 for 12,000 backyard composters (committed in the 1993 capital budget);

The Existing/Committed System in Region of Peel would also include:

- \$1,090,000 to purchase an additional 18,120 backyard composters to maintain 38.8% coverage by the year 2000.
- A new MRF would be constructed to process 60,500 tonnes/year by the year 2015 at a cost \$12,300,000. This MRF costs less than the facility discussed in a recent Regional report (Cave, 1994) but has been sized to meet the needs of the Existing/Committed system on a 2 shift/day basis in the year 2015.

Total Capital Cost: \$43,510,000

Table 6.1
Region of Peel
Capital Costs for Residential Systems (Diversion Plus Disposal)

System 1 Existing	System 2 Existing/Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6 Mixed Waste Processing
\$12,100,000 for new MRF (59,000 tonnes/year)	\$12,300,000 new MRF (60,500 tonnes/year)	\$15,800,000 for new MRF to process 93,000 tonnes/year	\$17,700,000 for new MRF to process 111,200 tonnes/year	\$17,700,000 for new MRF to process 111,200 tonnes/year	\$12,300,000 for new MRF to process 60,500 tonnes/year
\$1,044,000 for 17,400 byc by year 2000 to maintain 33.1% coverage of single- family households	\$1,090,000 for 18,120 byc to maintain 38.8% coverage of single-family households by year 2000	\$5,545,000 for 92,400 byc to provide 80% coverage of single- family households by year 2000	\$5,545,000 for 92,400 byc to provide 80% coverage of single-family households by year 2000	\$5,545,000 for 92,400 byc to provide 80% coverage of single- family households by year 2000	\$5,545,000 for 92,400 byc to provide 80% coverage of single-family households by year 2000
	\$29,000,000 for 7 new CRC's (1994 capital budget and R. Cave study)	\$29,000,000 for 7 new CRC's (1994 capital budget and R. Cave study)	\$29,000,000 for 7 new CRC's (1994 capital budget and R. Cave study)	\$32,200,000 for central composting plant (118,000 tonnes/year)	\$107,000,000 for 360,000 tonnes/year mixed waste processing and composting plant
	\$400,000 for mini recycling depots (1994 capital budget)	\$400,000 for mini recycling depots (1994 capital budget)	\$400,000 for mini-recycling depots (1994 capital budget)	\$22,400,000 for 224,220 household carts by year 2000	\$29,000,000 for 7 new CRC's (1994 capital budget and R. Cave study)
	\$720,000 for 12,000 byc (committed 1993 budget)	\$720,000 for 12,000 byc (1993 budget)	\$720,000 for 12,000 byc (1993 budget)	\$29,000,000 for 7 new CRC's (1994 capital budget and R. Cave study)	\$400,000 for mini-recycling depots (1994 capital budget)
				\$400,000 for mini-recycling depots (1994 capital budget)	\$720,000 for 12,000 byc (1993 budget)
				\$720,000 for 12,000 byc (1993 budget)	
Total capital cost \$13,144,000	Total capital cost \$43,510,000	Total capital cost: \$51,465,000	Total capital cost \$53,365,000	Total capital costs \$107,965,000	Total capital cost \$154,965,000
		Revenues: \$23,300,000/year in year 2000			
Notes: <ul style="list-style-type: none"> All values in \$1992 "byc" refers to backyard composters Facilities sized for processing requirements in year 2015 Costs for backyard composters and household carts (for wet/dry system) shown to service number of single family households in the Year 2000 Direct cost revenues shown for year 2000 All MRFs sized and costed to run at 2 shifts/day, 250 d/year in the year 2015, one new MRF for each Region for each system Central composting and mixed waste processing and composting plants sized to run 250 days/year, with capacity to process tonnes generated in year 2015 1994 Region of Peel capital budget had allocated \$24 million for construction of community recycling centres (CRC's). Estimate of \$29 million developed by R. Cave (March 1994) used for analysis 					

System 3 — Direct Cost

Capital

The Direct Cost system would include commitments made in the 1993 - 1998 Capital Budgets which are:

- 7 community recycling centres at a cost of \$29,000,000 (estimated by Cave, 1994);
- \$720,000 for 12,000 backyard composters (committed in the 1993 capital budget);
- \$400,000 for mini recycling depots (1994 capital budget).

The Direct Cost System would process 93,000 tonnes of dry material by the year 2015. A new MRF at a cost of \$15,800,000 would be required to meet this need.

The Region of Peel will have 224,222 single-family households by the year 2000. To provide coverage to 80% of single family homes, a total of 179,378 backyard composters need to be in place by the year 2000. As 68,839 backyard composters were in place in 1993, this means purchase of approximately 92,400 additional backyard composters at a cost of approximately \$5,545,000 (\$60/composter).

Revenues

Direct Cost system revenues in the year 2000 would be \$23,300,000, based on service to 224,222 single-family households.

Total Capital Cost: \$51,465,000.
Revenues (Year 2000): \$23,300,000

System 4 — Expanded Blue Box

Capital expenditures for the Expanded Blue Box System are:

- \$17,700,000 for new MRF to process 111,200 tonnes/year;
- \$29,000,000 for 7 community recycling centres;
- \$720,000 for 12,000 backyard composters (1993 capital budget);
- \$400,000 for mini-recycling depots (1994 capital budget);
- \$5,545,000 for additional 92,400 backyard composters (see System 3 for explanation).

Total Capital Cost \$53,365,000

System 5 — Wet/Dry

The Wet/Dry System would require the following capital costs:

- \$17,700,000 for new MRF to process 111,200 tonnes/year;
- \$29,000,000 for 7 community recycling centres;
- \$720,000 for 12,000 backyard composters (1993 capital budget);
- \$400,000 for mini-recycling depots (1994 capital budget);

- \$5,545,000 for 92,400 backyard composters;
- \$32,200,000 for a central composting plant to process 118,000 tonnes/year;
- \$22,400,000 to provide 224,220 roll-out carts to single-family households.

The possibility of sharing a composting facility with Halton was not addressed in this analysis, but has been under consideration for some time (Williams, 1994).

Total Capital Costs: \$107,965,000

System 6 — Mixed Waste Processing

Capital costs of the Mixed Waste Processing System are:

- \$12,300,000 for new MRF to process 60,500 tonnes/year;
- \$29,000,000 for 7 community recycling centres;
- \$720,000 for 12,000 backyard composters (1993 capital budget);
- \$400,000 for mini-recycling depots (1994 capital budget);
- \$5,540,000 for 92,400 backyard composters to provide coverage to 80% of single-family households;
- \$107,000,000 for a mixed waste processing and composting plant to process 360,000 tonnes/year;

Total Capital Cost \$154,965,000

6.2 Operating Costs

Blue Box Collection and Processing

Discussions at a meeting held with Region of Peel staff (Williams, Morgan Fraser, 1993) on June 18, 1993, indicated that Blue Box material processing net of revenue is approximately \$30/tonne. Since Blue Box revenues for Region of Peel were not identified, the average Blue Box revenue of \$26/tonne from Region of Durham was used. A Blue Box processing cost of \$56/tonne (\$30 plus revenue) was calculated and used for this analysis. Region of Peel staff confirmed that these costs were reasonable.

Blue Box collection costs of \$125/tonne confirmed by Region of Peel staff.

Yard Waste

Yard waste collection costs were taken from an AMRC report and were based on the \$74/tonne collection cost reported by Etobicoke for collection of bagged leaf and yard waste. (ORTECH International 1993).

Yard waste processing costs were taken from the same AMRC report and were based on an allowance of \$33/tonne for operation of an open windrow site, and \$22/tonne for capital costs (for Waterloo, Ontario).

Regional of Peel staff confirmed that these costs were reasonable.

Other Waste Diverted

Other waste diverted includes miscellaneous materials collected at depots and transfer stations, such as wood and brush, leaves and yard waste, scrap metal, OCC, ONP, drywall, tires, waste oil, batteries, propane tanks, paint products and clean fill. A rate of \$140/tonne for other waste diverted is used based on discussions with Region of Peel staff, who estimated that the cost for collection and processing of these materials is between \$100 (originally used) and \$188/tonne (reported by Region of Durham).

Garbage Collection and Disposal

Garbage collection costs of \$40/tonne were used, based on discussions with Region of Peel staff.

6.3 System Costs

System cost estimates are presented in detail in Table 6.2 and 6.3, and are summarized in Tables 6.4 and 6.5 for disposal rates of \$50/tonne and \$100/tonne respectively.

The estimated annual system costs (diversion plus disposal) and the system cost per household (diversion plus disposal) in the year 2000 for disposal rates of \$50/tonne and \$100/tonne are summarized in Table 6.6.

Table 6.2
Region of Peel
Unit Costs and Cost Estimates (Diversion Plus Disposal)
Disposal \$50/tonne
Year 2000

Residential System %	System Description		Blue Box Collection	Blue Box Processing	Blue Box Revenue	Yard Waste Collection	Yard Waste Processing	Backyard Compost. Net	Other Waste Diverted	Garbage Collection	Garbage Disposal	Mixed Waste Processing	Wet/Dry Collection	Wet Composting
	Unit Cost	(\$/t)	\$125	\$56	\$26	\$74	\$55	\$45	\$140	\$40	\$50	\$92	\$77	\$71
1	Existing	tonnes cost (\$)	47,567 \$5,945,823	47,567 \$2,663,728	47,567 \$1,236,731	9,729 \$719,981	9,729 \$535,121	12,199 \$548,971	6,662 \$932,739	321,728 \$12,869,113	321,728 \$16,086,392			
2	Existing/Committed	tonnes cost (\$)	48,566 \$6,070,759	48,566 \$2,719,700	48,566 \$1,262,718	29,637 \$2,193,135	29,637 \$1,630,033	14,775 \$664,871	6,662 \$932,739	298,246 \$11,929,821	298,246 \$14,912,277			
3	Direct Cost	tonnes cost (\$)	74,840 \$9,354,979	74,840 \$4,191,030	74,840 \$1,945,836	35,953 \$2,660,495	35,953 \$1,977,395	28,793 \$1,295,707	6,662 \$932,739	251,638 \$10,065,512	251,638 \$12,581,890			
4	Expanded Blue Box	tonnes cost (\$)	89,553 \$11,194,098	89,553 \$5,014,956	89,553 \$2,328,372	29,637 \$2,193,120	29,637 \$1,630,022	25,841 \$1,162,856	7,236 \$1,013,104	245,618 \$9,824,720	245,618 \$12,280,900			
5	Wet/Dry	tonnes cost (\$)		89,553 \$5,014,956	89,553 \$2,328,372			25,841 \$1,162,856	7,236 \$1,013,104		193,275 \$9,663,748		364,807 \$28,090,134	81,979 \$5,820,524
6A	Mixed Waste Processing - low quality compost	tonnes cost (\$)	48,566 \$6,070,759	48,566 \$2,719,700	84,107 \$2,186,783	29,637 \$2,193,108	29,637 \$1,630,013	22,889 \$1,030,005	6,662 \$932,739	290,132 \$11,605,260		290,132 \$26,692,098		
6B	high quality compost	tonnes cost (\$)									178,415 \$8,920,766 102,240 \$5,112,004			

Notes

- Population growth factor 1992 - 2000 = 1.27
- The housing profile has been assumed to remain as per 1992 for the material flow estimates
- Estimates of source reduction have not been accounted for in the analysis of cost. Material flows would be reduced depending on the level of source reduction
- Blue Box Collection cost is \$125/tonne (Williams, 1993)
- Blue Box Processing cost is \$56/tonne (Williams, 1993), processing net of revenue is \$30/tonne
- Blue Box Revenue based on information for Region of Durham (Revenue for Peel not broken out in budget)
- Yard Waste collection cost based on Etobicoke cost of \$74/tonne for bagged leaf and yard waste.
- Yard Waste processing based on \$22/tonne capital, \$33/tonne operating (for Waterloo, Ontario, Ortech International, 1993)
This is similar to Hanesill Composting Facility (\$40-60/tonne, without pre-processing)
- Other Waste Diverted cost - RIS estimate based on discussions with Region of Peel - cost is between \$100 and \$188/tonne (Williams, 1993)
- Garbage Collection cost based on discussions with Region of Peel (Williams, 1993)
- A low Garbage Disposal cost of \$50/tonne is assumed to assess sensitivity
- Wet Processing cost based on cost for in-vessel composting facility estimated for Greater Vancouver Regional District, (CH2MHILL, Cedar Grove Compost Co., RIS, 1993)
- Wet/Dry Collection cost based on centralized composting cost estimated for Mississauga, (Proctor & Redfern, 1994)
- Mixed Waste Processing cost is based on data from existing MSW facilities in U.S.
- High quality compost meets MOEB compost quality guidelines; low quality compost does not meet MOEB compost quality guidelines

Table 6.3
Region of Peel
Unit Costs and Cost Estimates (Diversion Plus Disposal)
Disposal \$100/tonne
Year 2000

Residential System No.	System Description		Blue Box Collection	Blue Box Processing	Blue Box Revenue	Yard Waste Collection	Yard Waste Processing	Backyard Compost. Net	Other Waste Diverted	Garbage Collection	Garbage Disposal	Mixed Waste Processing	Wet/Dry Collection	Wet Composting
	Unit Cost	(\$A)	\$125	\$56	\$26	\$74	\$55	\$45	\$140	\$40	\$100	\$92	\$77	\$71
1	Existing	tonnes cost (\$)	47,567 \$5,945,823	47,567 \$2,663,728	47,567 \$1,236,731	9,729 \$719,981	9,729 \$535,121	12,199 \$548,971	6,662 \$932,739	321,728 \$12,869,113	321,728 \$32,172,783			
2	Existing/Committed	tonnes cost (\$)	48,566 \$6,070,759	48,566 \$2,719,700	48,566 \$1,262,718	29,637 \$2,193,135	29,637 \$1,630,033	14,775 \$664,871	6,662 \$932,739	298,246 \$11,929,821	298,246 \$29,824,553			
3	Direct Cost	tonnes cost (\$)	74,840 \$9,354,979	74,840 \$4,191,030	74,840 \$1,945,836	35,953 \$2,660,505	35,953 \$1,977,402	28,793 \$1,295,707	6,662 \$932,739	251,638 \$10,065,512	251,638 \$25,163,780			
4	Expanded Blue Box	tonnes cost (\$)	89,553 \$11,194,098	89,553 \$5,014,956	89,553 \$2,328,372	29,637 \$2,193,129	29,637 \$1,630,028	25,841 \$1,162,856	7,236 \$1,013,104	245,618 \$9,824,720	245,618 \$24,561,800			
5	Wet/Dry	tonnes cost (\$)		89,553 \$5,014,956	89,553 \$2,328,372			25,841 \$1,162,856	7,236 \$1,013,104		193,275 \$19,327,495		364,807 \$28,090,134	81,979 \$5,820,524
6A	Mixed Waste Processing - low quality compost	tonnes cost (\$)	48,566 \$6,070,759	48,566 \$2,719,700	84,107 \$2,186,783	29,637 \$2,193,116	29,637 \$1,630,018	22,889 \$1,029,991	6,662 \$932,739	290,132 \$11,605,260		290,132 \$26,692,098		
6B	- high quality compost	tonnes cost (\$)									178,415 \$17,841,532 102,240 \$10,224,008			

Notes:

- Population growth factor 1992 - 2000 = 1.27
- The housing profile has been assumed to remain as per 1992 for the material flow estimates
- Estimates of source reduction have not been accounted for in the analysis of cost. Material flows would be reduced depending on the level of source reduction
- Blue Box Collection cost is \$125/tonne (Williams, 1993)
- Blue Box Processing cost is \$56/tonne (Williams, 1993), processing net of revenue is \$30/tonne
- Blue Box Revenue based on information for Region of Durham (Revenue for Peel not broken out in budget)
- Yard Waste collection cost based on Etobicoke cost of \$74/tonne for bagged leaf and yard waste
- Yard Waste processing based on \$22/tonne capital, \$33/tonne operating (for Waterloo, Ontario; Ortech International, 1993). This is similar to Hensell Composting Facility (\$40-60/tonne, without pre-processing).
- Other Waste Diverted cost - RIS estimate based on discussions with Region of Peel - cost is between \$100 and \$184/tonne (Williams, 1993).
- Garbage Collection cost based on discussions with Region of Peel (Williams, 1993)
- A high Garbage Disposal cost of \$100/tonne is assumed to assess sensitivity
- Wet Processing cost based on cost for in-vessel composting facility estimated for Greater Vancouver Regional District, (CH2MHILL, Cedar Grove Compost Co., RIS, 1993)
- Wet/Dry Collection cost based on centralized composting cost estimated for Mississauga, (Proctor & Redfern, 1994)
- Mixed Waste Processing cost is based on data from existing MSW facilities in U.S.
- High quality compost meets MOEB compost quality guidelines; low quality compost does not meet MOEB compost quality guidelines

Table 6.4
Region of Peel
Summary of Residential System Costs (Diversion and Disposal)
Disposal \$50/tonne
Year 2000

Residential System No.	System Description	Diversion (%)	Diversion System Costs			Disposal System Costs			Total System Cost	Diversion System Costs		Total System Cost \$/hhid
			Collection	Processing	Total	Collection	Disposal	Total		Tonnes diverted	\$/hhid	
1	Existing	19	\$6,665,803	\$3,443,828	\$10,109,631	\$12,869,113	\$16,086,392	\$28,955,505	\$39,065,136	\$133	\$33	\$126
2	Existing/Committed	25	\$8,263,894	\$4,684,625	\$12,948,518	\$11,929,821	\$14,912,277	\$26,842,098	\$39,790,616	\$130	\$42	\$129
3	Direct Cost	37	\$12,015,473	\$6,451,035	\$18,466,509	\$10,065,512	\$12,581,890	\$22,647,402	\$41,113,911	\$126	\$60	\$133
4	Expanded Blue Box	38	\$13,387,217	\$6,492,566	\$19,879,783	\$9,824,720	\$12,280,900	\$22,105,620	\$41,985,403	\$131	\$64	\$136
5	Wet/Dry	51	\$13,207,963	\$10,683,068	\$23,891,031	\$14,882,171	\$9,663,748	\$24,545,919	\$48,436,950	\$117	\$77	\$157
6A	Mixed Waste Processing	55 - 74	\$16,866,013	\$30,817,772	\$47,683,785	\$7,136,613	\$8,920,766	\$16,057,378	\$63,741,163	\$217	\$154	\$206
6B			\$22,731,506	\$30,817,772	\$53,549,278	\$4,089,603	\$5,112,004	\$9,201,607	\$62,750,885	\$181	\$173	\$203

Notes:

1. The projected total households has been used for determining cost per household

2. Estimated costs include revenues from sale of recyclables.

No. of Households (2000) = 309,272

Table 6.5
Region of Peel
Summary of Residential System Costs (Diversion Plus Disposal)
Disposal \$100/tonne
Year 2000

Residential System No.	System Description	Diversion (%)	Diversion System Costs			Disposal System Costs			Total System Cost	Diversion System Costs		Total System Cost \$/hh
			Collection	Processing	Total	Collection	Disposal	Total		House Diverted	House	
1	Existing	19	\$6,665,803	\$3,443,828	\$10,109,631	\$12,869,113	\$32,172,783	\$45,041,896	\$55,151,527	\$133	\$33	\$178
2	Existing/Committed	25	\$8,263,894	\$4,684,625	\$12,948,518	\$11,929,821	\$29,824,553	\$41,754,374	\$54,702,893	\$130	\$42	\$177
3	Direct Cost	37	\$12,015,483	\$6,451,043	\$18,466,526	\$10,065,512	\$25,163,780	\$35,229,292	\$53,695,818	\$126	\$60	\$174
4	Expanded Blue Box	38	\$13,387,226	\$6,492,572	\$19,879,799	\$9,824,720	\$24,561,800	\$34,386,520	\$54,266,319	\$131	\$64	\$175
5	Wet/Dry	51	\$13,207,963	\$10,683,068	\$23,891,031	\$14,882,171	\$19,327,495	\$34,209,666	\$58,100,697	\$117	\$77	\$188
6A	Mixed Waste Processing	55 - 74	\$16,866,021	\$30,817,763	\$47,683,784	\$7,136,613	\$17,841,532	\$24,978,144	\$72,661,928	\$217	\$154	\$235
6B			\$22,731,514	\$30,817,763	\$53,549,277	\$4,089,603	\$10,224,008	\$14,313,611	\$67,862,888	\$181	\$173	\$219

Notes:

1. The projected total households has been used for determining cost per household.

2. Estimated costs include revenues from sale of recyclables.

No. of Households (2000) = 309,272

Table 6.6
Region of Peel
Summary of Residential System Costs (Diversion Plus Disposal)

Residential System #	System Description	ANNUAL SYSTEM COSTS (DIVERSION + DISPOSAL) IN YEAR 2000			
		\$50/tonne disposal		\$100/tonne disposal	
		\$million	\$/hh	\$million	\$/hh
1	Existing	39.1	126	55.2	178
2	Existing/Committed	39.8	129	54.7	177
3	Direct Cost	41.1	133	53.7	174
4	Expanded Blue Box	42.0	136	54.3	175
5	Wet/Dry	48.4	157	58.1	188
6A	Mixed Waste – Low Quality Compost	63.7	206	72.7	235
6B	Mixed Waste – High Quality Compost	62.8	203	67.9	219

6.4 References

Cave, R. and Associates, 1994. Coordinated Materials Recovery System Study-Final Report to the Regional Municipality of Peel Waste Management Division, February 1994.

Future Urban Research, *GTA 3Rs Analysis, Municipal Finance Technical Appendix*, 1994.

Ortech International. 1993. *AMRC Leaf and Yard Waste Composting Study*. Prepared for the Association for Municipal Recycling Co-ordinators.

Region of Peel, Waste Management Capital Projects, 1994 Capital Budget and Forecast to 1998 Draft for Budget Subcommittee Review, March 1994.

Personal Communications and Comments

Cave, 1993. Personal communication, 1993.

Morgan-Fraser, L. Region of Peel Works Department, 1993. Personal communication, June 1993.

Watson, P., Region of Durham. 1993. Personal communication, June 1993.

Williams, G., Region of Peel. 1993. Personal communication, June 1993.

7.0 REGION OF HALTON RESIDENTIAL SYSTEM COST ESTIMATES

Cost estimates for six systems were not carried out for the Region of Halton, since Halton has its own landfill which was recently opened. Halton is therefore not part of the GTA landfill site selection process. However, it was felt that there was value to addressing Halton costs using the methods applied to the other GTA Regions for comparison. Cost data are therefore presented for the Existing and Existing/Committed systems only for Region of Halton.

The system development process is described in Section 5 of the EA Input Document and Section 3 of the Service Technical Appendix.

Schedule A of this Appendix lists the components of the residential systems. Components italicized in the Existing and Existing/Committed Systems are those components which must be added to provide the same level of 3Rs service throughout the study period (to accommodate projected population increases). Components italicized in Systems 3 to 6 are the components which have been added to the Existing/Committed System which is the base for systems development.

7.1 Capital Costs

System 1 — Existing

Capital costs for the existing system were not considered in this analysis, as it is in place at this time and is assumed not to require additional capital expenditure.

System 2 — Existing/Committed

The 5 year funding commitments for Region of Halton are (Future Urban Research, 1994):

- \$500,000 for new HHW depot
- \$25,000,000 for Regional composting facility (note: no provision in 5-year forecast and 1993 capital budget)
- \$255,000 for recycling vehicles (note: to be sold in conjunction with contract for collection of recyclables)
- \$207,000 for change in HHW service level in Burlington
- \$87,700 to cover changes in recycling contract operations
- \$34,300 for new Igloos
- \$107,400 for waste reduction education and display materials

Total Capital Cost: \$26,200,400.

7.2 Unit Operating Costs

Blue Box Collection and Processing

Blue Box collection costs of \$42.60/tonne and Blue Box processing costs of \$87/tonne were based on discussions with Region of Halton staff and MOEE (WRO) staff.

Blue Box revenues were estimated at \$42.88/tonne, based on information from Region of Halton and MOEE (WRO).

Yard Waste

Limited yard waste cost information was obtained from Halton Region municipalities. Therefore yard waste collection costs were taken from an AMRC report and were based on the \$74/tonne collection cost reported by Etobicoke for collection of bagged leaf and yard waste. (ORTECH International, 1993).

In the absence of other data, yard waste processing costs were taken from the above AMRC report and were based on an allowance of \$33/tonne for operation of an open windrow site, and \$22/tonne for capital costs (for Waterloo, Ontario).

Other Waste Diverted

Other waste diverted includes miscellaneous materials collected at depots and transfer stations, such as wood and brush, leaves and yard waste, scrap metal, OCC, ONP, drywall, tires, waste oil, batteries, propane tanks, paint products and clean fill. In the absence of better cost information for Halton Region, an assumed unit cost of \$188/tonne was used based on Durham data (Watson, 1993).

Garbage Collection and Disposal

A garbage collection cost of \$38/tonne was used, based on information provided by the municipalities of Burlington, Halton Hills and Milton (Anderson, P, Antonio, P, Sargeant, P, 1993).

A garbage disposal cost of \$150/tonne was used, based on the Halton Region tipping fee provided by Halton Region staff (Johns, L. 1993).

7.3 System Costs

The unit operating costs and quantities of materials handled (tonnes) by the Existing and Existing/Committed systems are presented in Table 7.1. Table 7.2 is a summary of the total estimated system costs based on the unit operating costs.

As shown in Table 7.2, the total annual system costs for the Existing and Existing/Committed systems are estimated at \$26.7 million and \$25.9 million, based on a disposal rate of \$150/tonne which is the rate charged at the Halton landfill. The total system costs per household are estimated at \$184/hhld/year and \$179/hhld/year for the two systems.

Table 7.1
Region of Halton
Unit Costs and Cost Estimates (Diversion Plus Disposal)
Disposal \$150/tonne
Year 2000

System		Blue Box Collection	Blue Box Processing	Blue Box Revenue	Yard Waste Collection	Yard Waste Processing	Backyard Composting	Other Waste Diversion	Garbage Collection	Garbage Disposal	MSW Transfer	Wet/Dry Transfer	Vol Transfer
Unit Cost (\$/t)		\$43	\$87	\$43	\$74	\$55	\$45	\$188	\$38	\$150			
Existing	tonnes	33,634	33,634	33,634	18,900	18,900	5,473	449	111,888	111,888			
	cost (\$)	\$1,432,827	\$2,926,533	\$1,442,245	\$1,398,600	\$1,039,500	\$246,265	\$84,329	\$4,251,744	\$16,783,200			
Existing/ Committed	tonnes	39,997	39,997	39,997	18,900	18,900	6,537	449	104,460	104,460			
	cost (\$)	\$1,703,891	\$3,480,177	\$1,715,090	\$1,398,600	\$1,039,500	\$294,177	\$84,329	\$3,969,491	\$15,669,045			

Notes:

1. Population growth factor 1992 - 2000 = 1.26
2. The housing profile has been assumed to remain as per 1992 for the material flow estimates
3. Estimates of source reduction have not been accounted for in the analysis of cost. Material flows would be reduced depending on the level of source reduction.
4. Blue Box collection costs based on information received from MOEE - WRO, Oct 13, 1993
5. Blue Box processing costs based on information received from MOEE - WRO, Oct 13, 1993
6. Blue Box revenues based on information received from MOEE - WRO, Oct 13, 1993
7. Yard Waste collection cost (as per Pool) based on Etobicoke cost of \$74/tonne for bagged leaf and yard waste.
8. Yard Waste processing (as per Pool) based on \$22/tonne capital, \$33/tonne operating (for Waterloo, Ontario; from AMRC report).
9. Other Waste Diversion cost based on \$75,000/400 tonnes (\$188/tonne - from Oshawa transfer station in Durham)
10. Garbage Collection cost based on information received from area municipalities (RIS survey - Feb/93)
11. High quality compost meets MOEE compost quality guidelines; low quality compost does not meet MOEE compost quality guidelines.

Table 7.2
Region of Halton
Summary of Residential System Costs (Diversion Plus Disposal)
Disposal \$150/tonne
Year 2000

Residential System No.	System Description	Households (th)	Diversion System Costs			Disposal System Costs			Total System Cost	Diversion System Costs		Total System Cost (\$/hd)
			Collection	Processing	Total	Collection	Disposal	Total		Household diverted	Public	
1	Existing	34	\$2,831,427	\$2,854,382	\$5,685,809	\$4,251,744	\$16,783,200	\$21,034,944	\$26,720,753	\$97	\$39	\$184
2	Existing/Committed	39	\$3,102,491	\$3,183,093	\$6,285,584	\$3,969,491	\$15,669,045	\$19,638,536	\$25,924,120	\$95	\$43	\$179

Notes:
1. The projected total households has been used for determining cost per household.
2. Estimated costs include revenues from sale of recyclables.

No. of Households = 145,146

7.4 References

Future Urban Research, *GTA 3Rs Analysis - Municipal Finance Technical Appendix*, 1994.

Ortech International. 1993. *AMRC Leaf and Yard Waste Composting Study*. Prepared for the Association for Municipal Recycling Co-ordinators.

Personal Communications and Comments

Anderson, P. 1993 Waste Management Department, City of Burlington. Personal communication, October 1993.

Antonio, P. Milton Public Works Department, 1993. Personal communication, October 1993.

Johns, L. Halton Region. Personal communication, October 1993.

Sargeant, P. Halton Hills, 1993. Personal communication, October 1993.

Watson, P., Region of Durham. 1993. Personal communication, June 1993.

8.0 IC&I SYSTEM COST ESTIMATES

8.1 General

This chapter presents the estimated costs for the six IC&I systems presented and discussed in the Service Technical Appendix, and also presents the basis for these estimates. The six IC&I systems are as follows:

IC&I System 1	Existing;
IC&I System 2	Existing/Committed;
IC&I System 3	Extended 3Rs Regulations;
IC&I System 4	Expanded 3Rs Regulations;
IC&I System 5	Expanded 3Rs Regulations with Organics;
IC&I System 6	No Unprocessed Waste to Landfill.

The system development process is described in Section 5 of the EA Input Document and Section 3 of the Service Technical Appendix.

Schedule A of this Appendix lists the components of the residential systems. Components italicized in the Existing and Existing/Committed Systems are those components which must be added to provide the same level of 3Rs service throughout the study period (to accommodate projected population increases). Components italicized in Systems 3 to 6 are the components which have been added to the Existing/Committed System which is the base for systems development.

Section 8.2 of this chapter describes factors which impact on costs of IC&I waste management. Sections 8.3 to 8.5 describe the approach to estimating the cost of these systems. Section 8.6 summarizes the estimated costs for the systems.

8.2 IC&I Waste Management Cost and Price Considerations

Determining IC&I waste management costs in GTA is a difficult task. Very little information is available on the costs of IC&I waste management systems. Unlike the residential sector, where budgets are maintained by local and regional municipalities, there are no central budget sources for the IC&I sector. IC&I waste management is carried out by the private sector, and there are currently no data reporting requirements in place.

Management of IC&I wastes is accomplished in many ways. The costs and where they are borne depend on many factors. These include:

- the volume of material handled
- the type of waste material
- technical limitations on processing
- the market value of the waste material after processing
- whether collected material is clean, source separated, commingled with other materials, or in a mixed waste stream
- the level of processing (e.g. loose vs baled)
- the frequency of collection
- the geographic location of clients and the concentration of clients in the areas served by the hauler or recycler.

Private haulers and recyclers offer a wide range of programs. Some waste management companies concentrate only on very specific materials or a mixture of similar materials, such as paper. Other companies handle a diverse range of materials. These companies may

collect a range of materials from one source and they may also collect different materials from different sources. Some programs require that wastes be source separated while in others mixed wastes are collected for subsequent separation at another facility. Some companies collect from a large geographic area while others serve a smaller locality. Similarly, some companies service only the largest generators of waste materials, while others will provide services to small generators.

8.3 Approach to Cost Estimates

8.3.1 General

The cost of the IC&I systems was developed by assigning unit rates per tonne for the costs for collection, recovery (net of revenues) and disposal for the following material categories:

- Old Corrugated Cardboard (OCC)
- Old Newsprint (ONP)
- Mixed Paper (note: in some cases fine paper fractions have been identified)
- Glass
- Ferrous Metal
- Non-ferrous Metal
- High-density Polyethylene (HDPE)
- Polyethylene Terephthalate (PET)
- Other Plastics
- Food Wastes
- Yard Wastes
- Wood
- Construction and Demolition (C&D) Wastes
- Other Wastes
- Wastes sent to disposal

The overall diversion system cost has been estimated by summing the costs of diverting each different material listed above. Similarly, the cost of disposing of material is estimated by multiplying the quantity of material estimated to be disposed by the assumed unit cost for disposal. The overall system costs have been estimated by summing the costs of handling all materials, including all material diverted and all material disposed.

Costs for all systems have been developed using "ballpark" prices for recycling and disposing of different materials obtained through discussion with GTA recyclers, and general IC&I waste collection and disposal rates obtained through discussions with haulers.

8.3.2 IC&I Cost Estimate Assumptions

- Unit cost estimates for management of each waste material category represent the unit price charged to IC&I establishments for the collection of recyclables or disposal of waste materials. It has been assumed for the purpose of this analysis that the prices charged by haulers, recyclers and end markets reflect the capital cost of the waste management infrastructure, the cost of operating the waste management systems as well as profits.
- Private sector haulers, recyclers and end markets would expand collection and processing capacity to handle all materials targeted by the various IC&I systems considered in the GTA 3Rs analysis. Therefore, all of the costs associated with providing increased capacity would be reflected in the price charged to generators.

- Unit costs for a given material have been assumed to be the same for all systems, regardless of the quantities of material handled. This does not account for any economies realized through further market development and from larger volumes of materials handled.
- Estimates of diversion and of the costs of the entire waste management systems have been based on the quantities of each material estimated to be diverted/disposed in the year 2000.
- All costs are based on 1992 Canadian \$.
- Revenues available from the sale of secondary materials have been incorporated into the net price charged for handling that material.

8.3.3 Limitations of Approach

- The internal costs incurred by individual waste generators are not reflected in the unit rates (prices) used for this analysis. These may include the cost of purchasing recycling bins, staff time in source separating waste, monitoring and reporting waste generation and preparing waste reduction plans, the cost of operating balers and compactors and the cost of renting additional storage space. It has been assumed that these costs, while they may be significant to individual generators, are relatively small compared to the overall system cost and have not been included in the analysis of cost for the comparative evaluation.
- Prices charged for various services are likely to change as economic factors change. As an example, the tipping fee for IC&I waste disposed within GTA dropped from \$150/tonne at the beginning of this study, to \$80-90/tonne during the course of this study, and was lowered to \$50/tonne in May, 1994. Information is not available to assess the effects of the lower GTA tipping fee on the unit rates charged for various waste diversion services in GTA.

The economic viability of waste diversion depends on numerous factors, including the strength of local economies, consumer preferences, technology, the strength of secondary material markets, procurement practices, the availability of inexpensive export options, the cost of disposal vs diversion etc. Because all of the factors are changing frequently, the costs presented in this document should be considered of value only for comparative purposes.

8.4 **IC&I Waste Collection Costs**

There are three basic waste collection services provided to the IC&I sector. These are:

- rear packer collection;
- bulk lift container; and
- front-end loader.

Each of these methods, and the available information on unit costs for these methods is described below.

Front-end Loader Service: With a front-end loader service, customers are provided with bins for storing waste ranging in size from 2 to 10 cubic yard (cy). The hauler empties the bins on either a regular schedule (e.g. once per week) or on a call basis using a front-end loader truck. Costs to the generator usually are charged on a per collection basis. This includes the cost of collection, and the cost of disposal of the waste at the landfill or transfer

station. The cost of storage bins may be included in the rate charged, or the storage bin rental cost is sometimes charged separately. The charge is based on the location of the client and the weight of waste collected. Typically heavier loads such as those generated by restaurants, are charged a higher price than lighter loads, from generators such as service stations. This is due to the higher tipping fees for heavier loads and the additional wear and tear on equipment. Table 8.1 presents costs quoted for three sizes of storage bins (costs were not provided for larger bins of up to 10 cubic yard capacity).

Table 8.1
Front-End Loader Collection Costs

Unit Rate	Collection Cost (incl. disposal fee)		
	2 cubic yards	4 cubic yards	6 cubic yards
\$/lift	\$20	\$31	\$41.50
\$/cubic yard	\$10	\$7.75	\$6.92
\$/tonne	\$210	\$163	\$145
Source:	Tendered quotes to one client (confidential)		
Note:	Collection cost includes the cost of disposal		
	Density assumed to be 47.6 kg/cy		

Roll-Off Container Service: With a roll-off container service, customers are provided with bins ranging in size between 12 and 40 cubic yards. The hauler collects the bin either on a regular schedule or on a call basis. Bins may be open-top which do not allow compacting or closed-top bins which either are combination compactors or may be attached to stationary compactors. Haulers can service and drop only one bin at a time. Therefore, costs generally are quoted in two ways: on a per tonne basis (because weights can be attributed to the corresponding generator) and on a per-collection basis. Costs to the generator include collection and disposal of the waste at landfill or transfer station. The cost of renting bins is either included or charged separately. The costs quoted for 3 different sizes of roll-off containers are presented in Table 8.2.

Table 8.2
Roll-Off Container Collection Costs

Unit Costs	Collection Cost (incl. disposal fee)	
	40 cubic yard Open Top	20 cubic yard Compacted
\$/lift	\$251	\$422
\$/cubic yard	\$6.28	\$21.10
\$/tonne	\$132	\$148
Source: Tendered quotes to one client (confidential) Note: Collection cost includes the cost of disposal (\$90/tonne in GTA when quote received) Density assumed to be 47.6 kg/cy for open bin Density assumed to be 142.8 kg/cy for the compacted bin		

Packer Truck Service: Packer truck service refers to collection of waste using a truck that is loaded manually, similar to those used for residential garbage collection. Packer trucks are typically used for clients that do not have the space or access for front-end loader bins. These include IC&I generators such as street-side retail, strip-malls and some restaurants, and generators that need frequent collection. The costs for this service are quoted on a per collection basis because no accurate weighing can take place at the time of collection. They include both the cost of collection and disposal at landfill or transfer station. The costs quoted for this type of contract for a daily collection service for one client was \$164 per collection. Based on the waste generation weights provided by the client for this contract, the cost per tonne was estimated at \$131/tonne (this cost includes a tipping fee which was not detailed.)

Collection Costs Used for Analysis

Based on the available information, a collection cost of approximately \$50/tonne was used in the IC&I system cost analysis.

8.5 Management Costs by Waste Material Category

The unit costs assumed for each material category are presented below by material. In most cases costs cited have been provided to the study team on a confidential basis either by the study team clients, or by haulers and recyclers surveyed as part of this study (again, confidentiality was guaranteed). It is expected that unit costs for handling the various IC&I waste materials would be affected to some extent by the tipping fee charged locally in the GTA. However, data was not available to adequately assess how the unit costs would vary with changes to the local tipping fee.

Different costs exist for different types of materials within the same material category (e.g. high volume, homogeneous scrap metals, dispersed low volume scrap metals and food and beverage containers collected with other wastes). In addition, there may be different costs for different collection methods for materials within the same category. These are not addressed in the analysis. The unit cost rate is assumed to cover a range of typical prices charged.

Office paper costs

- One source contacted by the study team was being charged \$91/tonne for collection of mixed office paper. For this contract the client was required to purchase bins separately from the recycler.
- One recycler contacted by the study team quoted a cost for collection of office paper of between \$97 and \$105 per tonne. This range reflected different costs for fine paper (computer printout and white ledger) and mixed office paper.
- A range of \$97 to \$105/tonne has been used in this analysis for the costs of handling fine paper and mixed paper.

OCC

- One client was being charged approximately \$25/week for a once per week collection of OCC in 6 cy bins using a front-end loader (\$4.17/cy). Assuming a density of 45 kg/cy for loose OCC, the cost would be approximately \$93/tonne.
- Other sources have quoted costs as high as \$7/cy or \$155/tonne (density of 45 kg/cy) for collection of loose OCC with a weekly packer truck service. Another source was being charged \$139/tonne in 1991 and \$151/tonne in 1992 for a 3-times-per-week service.
- A cost of \$90/tonne for handling OCC has been assumed for this analysis on the basis that firm markets are available for this material, it is relatively easy to process, and should be more economical to manage (by the fibre recycler) than other materials.

Mixed Office Programs

- One client is provided with a mixed recycling program. This includes, on a weekly basis, collection of 180 kg of office paper, 105 kg of newspaper and 34 kg of mixed food and beverage metal containers. On a yearly basis, total diversion is approximately 16.6 tonnes of waste material. The cost of collection is \$185/month or \$2,220/year. This is equivalent to approximately \$133.50/tonne. Desk-side collection bins and Otto carts are provided by the recycling operator.

A cost of \$140/tonne has been assumed for the collection of glass containers, mixed metal containers and mixed food and beverage plastic containers.

Glass

- The SWEAP Waste Composition Study indicates that in most IC&I sectors the majority of glass waste in the IC&I sector is container glass (excluding construction/demolition/renovation). (Proctor & Redfern Ltd., SENES Consultants, 1991).
- Little information is available on the cost of handling glass wastes other than container glass (such as plate glass). It is believed that except for high volumes of homogeneous glass material, most of this material is not currently collected and processed separately.

- A cost of \$140 per tonne has been assumed for processing of container glass. In the absence of reliable information, a cost of \$140/tonne has also been assumed for handling other glass.

Metals

- The largest portion of the metal waste stream has been assumed to be a dispersed and diverse range of scrap metals generated in relatively low quantities by a large number of different generators. These would include durable goods such as office fixtures, old machinery parts, containers (other than food and beverage containers) such as aerosol cans and paint cans, strapping and wire. Little information is available on the cost of handling such materials.

It has been assumed that while the metal has a value in the market, the diversity and low volumes generated by individual generators is such that there would be a cost to the generator for collection and handling. This has been assumed to be \$120 per tonne.

- The SWEAP Waste Composition Study indicated that much of metal waste was non-container waste (Proctor & Redfern, SENES Consultants Ltd., 1991). Similarly, NAPP indicated that a significant portion of packaging materials was non-container metals such as strapping and wire (NAPP, 1988 survey). Estimates of the percentage of metal wastes that are food and beverage containers were made based on these studies. Most food and beverage container metals likely would be collected commingled with other containers. For this analysis a handling cost for these materials of \$140 per tonne has been assumed.
- High volume, homogeneous scrap metals have traditionally been recycled. It has been assumed that if a demand for secondary metals exists, new sources of valuable scrap metal will continue to be identified. These have been assumed to be collected at zero cost to the generator. As a preliminary estimate, it has been assumed that 10% of the scrap metal waste generated (excluding food and beverage containers) is relatively high volume scrap with an appreciable market value to be collected at zero cost to the generator.

Plastics

- It is assumed that in many cases plastic containers are collected as a commingled waste stream and collected together with other wastes such as paper, glass and metal containers. The SWEAP Waste Composition Study indicates that the proportion of plastics that are containers is relatively low (Proctor & Redfern, SENES Consultants Ltd., 1991). PET and to a lesser extent, HDPE predominantly are used as containers (PET particularly for food and beverage). These are not generated in sufficient quantities by individual IC&I generators for it to be cost-effective for haulers and recyclers to collect and handle separately. In most cases PET and HDPE containers would be collected together, frequently commingled with metal food and beverage containers. A cost of \$140 per tonne therefore has been assumed for the collection and handling of PET and HDPE containers. It was assumed that all PET, a portion of HDPE and a smaller portion of other plastic wastes are containers.
- The most significant portion of the plastic waste stream has been assumed to be a dispersed and very diverse range of wastes. These would include packaging materials such as film plastics (the largest proportion in many sectors) (Proctor and Redfern, SENES Consultants Ltd., 1991), styrofoam packages and durable

consumer goods. Little information is available on the cost of handling these materials. Most of such plastics, particularly film, is not currently recycled.

- Because of the very low density of some plastic materials, the costs (per tonne) of collection are high relative to other more dense materials. Also, since there are technological limitations for processing (identification, separation and reprocessing), the value of the waste materials is low. Confidential client sources indicated costs as high as \$1200 per tonne for handling polystyrene. The costs would vary greatly among haulers and recyclers depending on their specific operations and programs. For this analysis, a cost of handling mixed plastic wastes has been assumed at \$280 per tonne. This is intended to represent the higher range of costs associated with handling mixed plastics.

Food and Yard Waste

- The cost of diverting food and yard waste has been based on tipping fees at Scotts Farm. The tipping fee ranges from \$30/tonne for source separated foods waste typically from grocery stores, that require no processing and are in demand from pig farmers, to \$75/tonne for wood paper and brush, which require processing (grinding). With an estimated collection cost of \$50 per tonne, the cost of diverting food has been assumed to be \$80/tonne, and the cost of diverting yard waste has been assumed to be \$125 per tonne.

Wood

- One recycler (confidential source) quoted typical costs between \$50 per tonne for handling clean recyclable wood and \$75 per tonne for handling contaminated and mixed wood wastes. Three other recyclers quoted costs for clean uncontaminated wood in the range of \$45/tonne to \$65/tonne. Therefore, with an assumed collection cost of \$50 per tonne, the cost for wood recycling for this analysis has been assumed to be \$115 per tonne.

C&D (Construction and Demolition)

- Three recyclers quoted tipping (processing) fees for mixed loads of C&D waste in the range of \$75/tonne to \$85/tonne. With the assumed collection cost of \$50 per tonne, the handling costs for C&D materials has been assumed to be \$130 per tonne for mixed C&D wastes.

Mixed Wastes

- WMI (Recycle Canada) operated a mixed waste processing facility in Etobicoke that accepted various mixed waste streams from IC&I generators. The tipping fee at this facility was \$115 per tonne (Recycle Canada, 1993). This facility closed in November 1993. This rate has been used as a cost representative of the type of mixed waste handling which may be a significant component of IC&I System 6. With the assumed collection cost of \$50 per tonne, the cost for mixed waste handling has been assumed to be \$165 per tonne. This cost includes the cost of disposal of residues.
- It has been assumed that all waste materials assumed to be source separated and diverted under the Existing/Committed System (60% coverage) would also be source separated under IC&I System 6. It has been assumed that all remaining wastes (except for wet organics, which would be source separated) would be collected and processed as mixed waste. The cost of handling these materials has been assumed to be \$165/tonne. The cost of handling all source separated wet organics would be \$125/tonne as for other systems.

- The costs of handling the "other waste" stream have been assumed to be the same as for handling mixed waste in a mixed waste facility, at \$165/tonne.

Disposal Costs

At the early stages of this study the tipping fees at GTA landfills were at \$150 per tonne. During the course of the study these tipping fees have fallen to approximately \$80 to \$90 per tonne and recently to \$50/tonne. For this analysis, scenarios representing three tipping fees at GTA landfills have been developed (\$50/tonne, \$85/tonne used in the preliminary analysis and \$100/tonne). Combined with the assumed collection cost of \$50 per tonne, disposal costs of \$100/tonne, \$135/tonne and \$150/tonne have been used for this analysis.

While it is expected that unit costs for handling the various IC&I waste materials would be affected to some extent by the GTA landfill tipping fee, data was not available to adequately assess how the unit costs would vary with changes to the GTA landfill tipping fee. Therefore, the unit costs for handling each material in the IC&I waste stream have been kept constant for these scenarios.

8.6 Cost Estimates for IC&I Waste Management Systems

Tables 8.3 through 8.8 present the quantities of each material diverted, the unit diversion and disposal costs used, and the associated total cost for diversion and disposal of each material for the six IC&I systems evaluated in the GTA 3Rs analysis. Estimates of waste management requirements for year 2000 have been used to determine the comparative costs of the different systems. Table 8.9 summarizes the diversion and costs for each system.

Table 8.9 shows the estimated total annual system costs (diversion plus disposal) range from approximately \$416 million for the Existing System to \$430 million for System 6 for the \$85/tonne disposal scenario, a variation of roughly 3%. The variation is more significant for the \$50/tonne disposal scenario, where system costs vary from \$335 million for the Existing System to \$430 million for System 6, a variation of approximately 28%. For the \$100/tonne disposal scenario the system costs vary by approximately 7% favouring the higher diversion systems.

The variation in total system costs among the six IC&I systems is a result of the substitution of different costs of diversion (as a result of increased recycling activity) for the cost of disposal at landfill. For the \$85/tonne and \$100/tonne disposal rates, the variation between the costs of different systems is small because the relative differences in the costs of diverting various materials and disposing of materials are not significant.

Given the level of accuracy of this analysis ($\pm 25\%$), the costs for the different systems should be considered essentially the same.

Table 8.9 also shows the diversion system cost increases from \$112/tonne for the Existing System, to \$120/tonne for the Expanded 3Rs System. The diversion cost is \$117/tonne for System 5, reflecting the lower cost for diverting rather than disposing of food waste. The diversion cost for System 6 is \$215/tonne reflecting the more expensive processing costs.

The total diversion system cost increases from \$103 million for the Existing System to \$230 million for System 5 and \$430 million for System 6. For System 6, the diversion system cost (\$430 million/year) is higher relative to other systems because the cost of disposal of residues from mixed waste processing facilities is included as part of the diversion system cost. Therefore the diversion system cost for System 6 is the same as the total system cost for System 6 (refer to Table 8.8).

Table 8.3
GTA
Summary of Estimated Costs
for IC&I Existing System
Year 2000

Material	Unit Cost (collection & processing - net revenue)	System 1 Existing System	
		Estimated Diversion (tonnes)	Estimated Cost (\$)
OCC	\$90	229,859	\$20,687,337
Pine Paper	\$97	81,365	\$7,892,365
Mixed Paper	\$105	173,658	\$18,234,065
Container Glass	\$140	17,042	\$2,385,933
Other Glass	\$140		\$0
Mixed Containers - Metal	\$140	29,984	\$4,197,775
Scrap Metals	\$120	35,680	\$4,281,652
High Volume Scrap Metals	\$0	3,964	\$0
PET and HDPE Containers	\$140	4,790	\$670,656
Mixed Plastic Containers	\$140	331	\$46,293
Mixed Scrap Plastics	\$280	6,283	\$1,759,120
Food	\$80	2,455	\$196,418
Yard	\$125	362	\$45,224
Wood	\$115	61,453	\$7,067,136
Mixed Const & Demo Loads	\$130	258,481	\$33,602,489
Other	\$165	10,543	\$1,739,582
Mixed Waste	\$165		\$0
Disposal - \$50/tonne (note 2)	\$100	2,323,008	\$232,300,754
Disposal - \$85/tonne (note 2)	\$135	2,323,008	\$313,606,018
Disposal - \$100/tonne (note 2)	\$150	2,323,008	\$348,451,131
Total Diversion System Cost		916,251	\$102,806,045
Total System Cost - disposal \$50/tonne		3,239,258	\$335,106,799
Total System Cost - disposal \$85/tonne		3,239,258	\$416,412,063
Total System Cost - disposal \$100/tonne		3,239,258	\$451,257,177
Notes:			
1. Costs represent best estimates from discussions and work with private haulers and processors in GTA			
2. A cost of \$50/tonne was used for collection of most materials in GTA, with three disposal rates, \$50/tonne, \$85/tonne and \$100/tonne, for total management costs (collection plus disposal) of \$100/tonne, \$135/tonne and \$150/tonne			
3. Materials such as metal, glass and plastic food and beverage containers are frequently collected together: the same costs for collection and processing have been used for these materials			
4. Employment growth (1992-2000) = 1.16			

Table 8.4
GTA
Summary of Estimated Costs
for IC&I Existing/Committed System
Year 2000

Material	Unit Cost (collection & processing - net revenue)	System 2 Existing/Committed System			
		Estimated Diversion 46% capture (tonnes)	Estimated Cost (\$)	Estimated Diversion 66% capture (tonnes)	Estimated Cost (\$)
OCC	\$90	229,859	\$20,687,337	229,859	\$20,687,337
Fine Paper	\$97	81,365	\$7,892,365	81,365	\$7,892,365
Mixed Paper	\$105	173,658	\$18,234,065	206,730	\$21,706,656
Container Glass	\$140	21,901	\$3,066,150	2,652	\$371,210
Other Glass	\$140	448	\$62,749	30,587	\$4,282,130
Mixed Container - Metal	\$140	32,225	\$4,511,442	47,373	\$6,632,214
Scrap Metals	\$120	54,473	\$6,536,773	72,053	\$8,646,389
High Volume Scrap Metals	\$0	6,053	\$0	8,006	\$0
PET and HDPE Containers	\$140	9,895	\$1,385,350	13,724	\$1,921,370
Mixed Plastic Containers	\$140	858	\$120,117	1,220	\$170,771
Mixed Scrap Plastics	\$280	16,302	\$4,564,448	23,176	\$6,489,289
Food	\$80	2,455	\$196,418	2,455	\$196,418
Yard	\$125	362	\$45,224	362	\$45,224
Wood	\$115	71,313	\$8,201,030	94,645	\$10,884,177
Mixed Const & Demo Loads	\$130	258,481	\$33,602,489	258,481	\$33,602,489
Other	\$165	10,965	\$1,809,165	16,447	\$2,713,748
Mixed Waste	\$165		\$0		\$0
Disposal - \$50/tonne (note 2)	\$100	2,268,646	\$226,864,644	2,150,124	\$215,012,444
Disposal - \$85/tonne (note 2)	\$135	2,268,646	\$306,267,269	2,150,124	\$290,266,799
Disposal - \$100/tonne (note 2)	\$150	2,268,646	\$340,296,966	2,150,124	\$322,518,666
Total Diversion System Cost		970,612	110,915,124	1,089,134	\$126,241,788
Total System Cost - disposal \$50/tonne		3,239,258	\$337,779,768	3,239,258	\$341,254,232
Total System Cost - disposal \$85/tonne		3,239,258	\$417,182,393	3,239,258	\$416,508,587
Total System Cost - disposal \$100/tonne		3,239,258	\$451,212,889	3,239,258	\$448,760,454
Notes: 1. Costs represent best estimates from discussions and work with private haulers and processors in GTA. 2. A cost of \$50/tonne was used for collection of most materials in GTA, with management costs (collection plus disposal), \$50/tonne, \$85/tonne and \$100/tonne, for total disposal costs of \$100/tonne, \$135/tonne and \$150/tonne. 3. Materials such as metal, glass and plastic food and beverage containers are frequently collected together; the same costs for collection and processing have been used for these materials. 4. Employment growth (1992-2000) = 1:16					

Table 8.5
GTA
Summary of Estimated Costs
for IC&I Extended 3Rs System
Year 2000

Material	Unit Cost (collection & processing net revenue)	System 3 Extended 3Rs System	
		Estimated Diversion (tonnes)	Estimated Cost (\$)
OCC	\$90	293,071	\$26,376,354
Flux Paper	\$97	82,833	\$8,034,759
Mixed Paper	\$105	299,593	\$31,457,272
Container Glass	\$140	49,849	\$6,978,855
Other Glass	\$140	2,402	\$336,337
Mixed Containers - Metal	\$140	74,305	\$10,402,768
Scrap Metals	\$120	98,755	\$11,850,628
High Volume Scrap Metals	\$0	10,973	\$0
PET and HDPE Containers	\$140	19,467	\$2,725,401
Mixed Plastic Containers	\$140	1,763	\$246,751
Mixed Scrap Plastics	\$280	33,488	\$9,376,550
High Vol. Mixed Scrap Plastics	\$0	0	\$0
Food	\$80	2,455	\$196,418
Yard	\$125	362	\$45,224
Wood	\$115	129,643	\$14,908,898
Mixed Const & Demo Loads	\$130	355,475	\$46,211,758
Other	\$165	24,670	\$4,070,622
Mixed Waste	\$165		\$0
Disposal - \$50/tonne (note 2)	\$100	1,760,155	\$176,015,464
Disposal - \$85/tonne (note 2)	\$135	1,760,155	\$237,620,877
Disposal - \$100/tonne (note 2)	\$150	1,760,155	\$264,023,196
Total Diversion System Cost		1,479,104	\$173,218,596
Total System Cost - disposal \$50/tonne		3,239,258	\$349,234,060
Total System Cost - disposal \$85/tonne		3,239,258	\$410,839,472
Total System Cost - disposal \$100/tonne		3,239,258	\$437,241,792
Notes: 1. Costs represent best estimates from discussions and work with private haulers and processors in GTA 2. A cost of \$50/tonne was used for collection of most materials in GTA, with three disposal rates, \$50/tonne, \$85/tonne and \$100/tonne, for management costs (collection plus disposal) of \$100/tonne, \$135/tonne and \$150/tonne 3. Materials such as metal, glass and plastic food and beverage containers are frequently collected together: the same costs for collection and processing have been used for these materials 4. Employment growth (1992-2000) = 1.16			

Table 8.6
GTA
Summary of Estimated Costs
for IC&I Expanded 3Rs System
Year 2000

Material	Unit Cost: (collection & processing - not covered)	System 4 - Expanded 3Rs System	
		Estimated Diversion (tonnes)	Estimated Cost (\$)
OCC	\$90	293,071	\$26,376,354
Fine Paper	\$97	82,833	\$8,034,759
Mixed Paper	\$105	444,022	\$46,622,303
Container Glass	\$140	49,849	\$6,978,855
Other Glass	\$140	5,539	\$775,428
Mixed Containers - Metal	\$140	34,733	\$4,862,598
Scrap Metals	\$120	180,239	\$21,628,635
High Volume Scrap Metals	\$0	20,027	\$0
PET and HDPE Containers	\$140	26,835	\$3,756,831
Mixed Plastic Containers	\$140	4,523	\$633,235
Mixed Scrap Plastics	\$280	85,939	\$24,062,913
Food	\$80	2,455	\$196,418
Yard	\$125	362	\$45,224
Wood	\$115	138,270	\$15,901,056
Mixed Const & Demo Loads	\$130	355,475	\$46,211,758
Other	\$165	24,670	\$4,070,622
Mixed Waste	\$165		\$0
Disposal - \$50/tonne (note 2)	\$100	1,490,418	\$149,041,824
Disposal - \$85/tonne (note 2)	\$135	1,490,418	\$201,206,462
Disposal - \$100/tonne (note 2)	\$150	1,490,418	\$223,562,736
Total Diversion System Cost		1,748,840	\$210,156,990
Total System Cost - disposal \$50/tonne		3,239,258	\$359,198,813
Total System Cost - disposal \$85/tonne		3,239,258	\$411,363,452
Total System Cost - disposal \$100/tonne		3,239,258	\$433,719,725
Notes:			
1. Costs represent best estimates from discussions and work with private haulers and processors in GTA			
2. A cost of \$50/tonne was used for collection of most materials in GTA, with three disposal rates, \$50/tonne, \$85/tonne and \$100/tonne, for management costs (collection plus disposal) of \$100/tonne, \$135/tonne and \$150/tonne			
3. Materials such as metal, glass and plastic food and beverage containers are frequently collected together: the same costs for collection and processing have been used for these materials			
4. Employment growth (1992-2000) = 1.16			

Table 8.7
GTA
Summary of Estimated Costs
for IC&I Expanded 3Rs Plus Organics System
Year 2000

Material	Unit Cost: (collection & processing - net revenue)	System 2 Expanded 3Rs Plus Organics System	
		Estimated Diversion (tonnes)	Estimated Cost (\$)
OCC	\$90	293,071	\$26,376,354
Fine Paper	\$97	82,833	\$8,034,759
Mixed Paper	\$105	444,022	\$46,622,303
Container Glass	\$140	49,849	\$6,978,855
Other Glass	\$140	5,539	\$775,428
Mixed Containers - Metal	\$140	86,074	\$12,050,307
Scrap Metals	\$120	134,032	\$16,083,832
High Volume Scrap Metals	\$0	14,892	\$0
PET and HDPE Containers	\$140	26,835	\$3,756,831
Mixed Plastic Containers	\$140	4,523	\$633,235
Mixed Scrap Plastics	\$280	85,939	\$24,062,913
Food	\$80	184,389	\$14,751,106
Yard	\$125	27,463	\$3,432,907
Wood	\$115	138,270	\$15,901,056
Mixed Const & Demo Loads	\$130	355,475	\$46,211,758
Other	\$165	24,670	\$4,070,622
Mixed Waste	\$165		\$0
Disposal - \$50/tonne (note 2)	\$100	1,281,383	\$128,138,317
Disposal - \$85/tonne (note 2)	\$135	1,281,383	\$172,986,728
Disposal - \$100/tonne (note 2)	\$150	1,281,383	\$192,207,476
Total Diversion System Cost		1,957,875	\$229,742,266
Total System Cost - disposal \$50/tonne		3,239,258	\$357,880,583
Total System Cost - disposal \$85/tonne		3,239,258	\$402,728,994
Total System Cost - disposal \$100/tonne		3,239,258	\$421,949,741
Notes:			
1. Costs represent best estimates from discussions and work with private haulers and processors in GTA			
2. A cost of \$50/tonne was used for collection of most materials in GTA, with three disposal rates, \$50/tonne, \$85/tonne and \$100/tonne, for management costs (collection plus disposal) of \$100/tonne, \$135/tonne and \$150/tonne			
3. Materials such as metal, glass and plastic food and beverage containers are frequently collected together: the same costs for collection and processing have been used for these materials			
4. Employment growth (1992-2000) = 1.16			

Table 8.8
GTA
Summary of Estimated Costs
for IC&I No Unprocessed Waste to Landfill System
Year 2000

Material	Unit Cost (collection & processing - not revenue)	System C - No Unprocessed Waste to Landfill System	
		Estimated Diversion (tonnes)	Estimated Cost (\$)
OCC	\$90	229,859	\$20,687,337
Fine Paper	\$97	81,365	\$7,892,365
Mixed Paper	\$105	206,730	\$21,706,656
Container Glass	\$140	2,652	\$371,210
Other Glass	\$140	30,587	\$4,282,130
Mixed Containers - Metal	\$140	47,373	\$6,632,214
Scrap Metals	\$120	72,053	\$8,646,389
High Volume Scrap Metals	\$0	8,006	\$0
PET and HDPE Containers	\$140	13,724	\$1,921,370
Mixed Plastic Containers	\$140	1,220	\$170,771
Mixed Scrap Plastics	\$280	23,176	\$6,489,289
Food	\$80	184,756	\$14,780,471
Yard	\$125	27,225	\$3,403,113
Wood	\$115	94,645	\$10,884,177
Mixed Const & Demo Loads	\$130	258,481	\$33,602,489
Other	\$165	16,447	\$2,713,748
Mixed Waste	\$165	1,735,343	\$286,331,555
Disposal (note 2)			\$0
Total Diversion System Cost		1,998,863	\$430,515,284
Total System Cost (note 2)		3,239,258	\$430,515,284
Notes: 1. Costs represent best estimates from discussions and work with private haulers and processors in GTA. 2. Mixed waste assumed to be garbage and dry recyclables collected together. Cost also includes cost of disposal of residues. Therefore, diversion system cost and total system cost are the same. 3. A cost of \$50/tonne was used for collection of most materials in GTA. 4. It is expected that the cost of handling mixed waste (assumed to be \$165/tonne when the tip fee was \$85/tonne) would depend on the disposal fee. However, no information was available on how it would vary with disposal fee. Therefore it was held constant for this analysis. 5. Materials such as metal, glass and plastic food and beverage containers are frequently collected together: the same costs for collection and processing have been used for these materials. 6. Food and yard waste diverted is assumed to be handled as a source separated stream. 7. Employment growth (1992-2000) = 1.16			

Table 8.9
GTA
Summary of Estimated Costs of
IC&I Systems
Year 2000

System No.	System	Estimated Diversion Rate (%)	Estimated Diversion System Cost (\$/tonne diverted)	Estimated Total Diversion System Cost (\$)	Estimated Total System Cost (\$50/tonne Disp.) (\$)	Estimated Total System Cost (\$65/tonne Disp.) (\$)	Estimated Total System Cost (\$100/tonne Disp.) (\$)
1	Existing	28% - 33%	\$112	\$102,806,045	\$335,106,799	\$416,412,063	\$451,257,177
2	Existing/Committed (40% Capture)	30% - 35%	\$114	\$110,915,124	\$337,779,768	\$417,182,393	\$451,212,089
2	Existing/Committed (60% Capture)	34% - 39%	\$116	\$126,241,788	\$341,254,232	\$416,508,587	\$448,760,454
3	Extended 3Rs	46% - 51%	\$117	\$173,218,596	\$349,234,060	\$410,839,472	\$437,241,792
4	Expanded 3Rs	54% - 59%	\$120	\$210,156,990	\$359,198,813	\$411,363,452	\$433,719,725
5	Expanded 3Rs with Organics	60% - 65%	\$117	\$229,742,266	\$357,880,583	\$402,728,994	\$421,949,741
6	No Unprocessed Waste to Landfill	62% - 67%	\$215	\$430,515,284	\$430,515,284	\$430,515,284	\$430,515,284

Notes:

1. Total Diversion System Cost for System 6 includes disposal cost of residues. Therefore, diversion system cost and total system cost are the same.
2. It is expected that the cost of handling mixed waste (assumed to be \$165/tonne when the tip fee was \$85/tonne) would depend on the disposal fee. However, no information was available on how it would vary with disposal fee. Therefore it was held constant for this analysis, and diversion and total system costs do not vary when the disposal fee is changed.

8.7 References

Recycling Council of Ontario (RCO). 1992. *Secondary Material Markets Directory*.

Proctor & Redfern, SENES Consultants Ltd., *Solid Waste Environmental Assessment Plan: Discussion Paper No. 4.3: Waste Composition Study*. June, 1991

National Taskforce on Packaging. Dec., 1992. *National Packaging Protocol: 1988 Benchmark Estimates*.

Personal Communications and Comments

Baker, David, WMI - Recycle Canada, 1993, personal communication with D. Baker, June, 1993

Bremner, John. Compost Management Associates. 1994. Personal communication with J. Bremner, May, 1994.

Horn, Jim. 1993. Personal communication with J. Horn, Resource Plastics, February, 1993

Rafferty, John, Metro Council Minneapolis-St Paul, Waste Management Div., Personal communication, June, 1993.

9.0 ASSESSMENT AND EVALUATION OF THE 3RS SYSTEMS

9.1 Introduction

This chapter details the net effects analysis undertaken by the Cost discipline. The six residential and six IC&I systems were compared using a set of established criteria. The relative importance of these criteria were evaluated, weighted and applied to each system in order to arrive at a hierarchy of highest to lowest-ranked residential 3Rs systems for each GTA Region, and a hierarchy based on cost of highest ranked to lowest ranked IC&I 3Rs Systems for the GTA.

9.2 Approach Overview

9.2.1 Methodology Description

The Net Effects Analysis of Residential and IC&I Systems for the Cost discipline included the following tasks:

1. Identification of criteria and indicators to be used for comparative evaluation of systems;
2. Ranking of criteria, according to utility to the analysis and the level of importance of the criteria relative to others;
3. Completion of a Net Effects Analysis for cost, for each region, for each of the six residential systems;
4. Completion of a Net Effects Analysis for cost for each of the six IC&I systems for the GTA;
5. Comparative evaluation and ranking of residential systems for each Region;
6. Comparative evaluation and ranking of IC&I systems for GTA.

Region-specific Net Effects Tables for Residential systems and GTA-level Net Effects Tables for IC&I systems are presented in Schedules B and C of this Appendix. Identification of criteria, criteria ranking and the comparative evaluation of residential and IC&I 3Rs systems are described in this chapter.

9.2.2 Residential System Cost Criteria

The Cost criteria group for residential systems contains only one criterion, which is the cost per household per year for the residential waste management system (diversion and disposal). This criterion provides a measure of how different diversion systems compare, when all waste management factors including both the costs of the diversion systems and the resulting savings in the waste disposal costs, are taken into account.

The indicator was estimated by developing the costs of the waste diversion system and the waste disposal system (in \$/year, using 1992 dollars) and dividing the sum of the costs by the total number of households in each Region in the year 2000. The indicator was estimated for all systems using waste quantity estimates for the year 2000 and unit cost rates experienced in 1992.

9.2.3 Residential System Criteria Ranking

No ranking of criteria was necessary, as only one criterion, the cost per household per year for the waste management system (diversion and disposal), was used.

9.2.4 Residential System Ranking

Residential systems were ranked according to the cost per household per year for the waste management system (diversion and disposal). Systems were ranked equally unless there was a difference of \$10/household/year or more in system costs at disposal rates of both \$50 and \$100/tonne.

9.2.5 Residential System Mitigation

Mitigation measures have not been incorporated in the net effects analysis for the cost discipline because there are insufficient data to quantify the potential cost advantages. In the absence of mitigation, it was assumed that the costs of any system component would not increase above those reported in 1992 by GTA municipalities. No specific measures were assumed in the systems analysis that would decrease the costs of 3Rs components to values lower than those reported in the literature or by GTA municipalities, which were used in the analysis for the Cost Discipline.

The following mitigation measures are possible and should be considered in the design of any residential system:

- all equipment and systems should be maintained in good working order, and should be replaced with state-of-the-art approaches when appropriate;
- economies of scale should be utilized wherever possible;
- frequency of collection could be reduced;
- the degree of source separation and segregation of materials collected could be varied;
- set-out methods and containers could be modified;
- co-collection could be used for different waste streams;
- new technologies should be used for collection, processing and end uses;
- promotion/education should be increased to encourage greater participation; and
- staff training should be increased to enhance productivity.

Such mitigation measures would result in the efficient operation and implementation of all systems. The costs used in the analysis reflect conservative values, and may decrease over time.

9.2.6 IC&I System Cost Criteria

Two criteria were used for evaluation of IC&I systems. These were:

- Cost/tonne diverted;
- Total system cost (diversion plus disposal) in \$/year.

The above two criteria were chosen as valuable indicators of the comparative costs of different IC&I waste diversion systems with different costs and performances.

Total System Cost measured the combined cost of disposal and diversion systems. Isolated, the separate costs of diversion and disposal would have little value as indicators, since a system which has a low diversion cost, due in part to a low diversion rate, would incur a correspondingly high disposal cost. For this reason, an indicator which combined diversion and disposal costs was considered of greatest value for comparing systems, as it shows how total system costs change as the rate of diversion varies.

The cost per tonne diverted measures the efficiency of the waste diversion system, and was used as a valuable indicator to compare different approaches to waste management. Differences in cost/tonne diverted of different systems indicate the relative costs of diverting different materials, and the cost efficiency of different diversion approaches.

9.2.7 IC&I System Criteria Ranking

The above criteria (cost/tonne diverted and total system cost) were ranked according to which was the most and least important in comparing different waste diversion systems. Table 9.1 presents the ranking of these two criteria for the IC&I systems.

The total cost for the waste management system was considered the more important criterion, as it provides a measure of how different diversion systems compare, when the costs of diversion and the resulting savings in the costs of disposal are taken into account. If total system costs are not included as an indicator, the financial and cost benefits of the waste diversion systems are not fully considered.

The cost per tonne diverted of the diversion system is considered less important, but it is valuable in comparing the cost efficiencies of different approaches to waste diversion. Systems with a very high cost per tonne diverted would be considered less favourable than systems with a low cost per tonne diverted.

9.2.8 IC&I System Ranking

Ranking of IC&I systems was based on Total System Cost. Where systems had similar costs, diversion cost per tonne was used to rank the systems.

9.2.9 IC&I System Mitigation

Mitigation measures have not been incorporated in the net effects analysis for the Cost Discipline because there are insufficient data to quantify the potential cost advantages. In the absence of mitigation, no specific measures were assumed in the systems analysis that would decrease the costs of 3Rs components to values lower than those reported in the survey of GTA haulers and recyclers, which was used in the analysis for the Cost Discipline. The costs used in the analysis reflect conservative values, and may decrease over time.

TABLE 9.1
Greater Toronto Area IC&I Systems
COST CRITERIA RANKING

DISCIPLINE		
Criterion	Rank Order	Rationale
Diversion System Cost (per tonne diverted)	2	This criterion was ranked lowest. While it attempts to compare particular cost efficiencies of different systems, it does not consider all of the cost benefits of increased diversion, which include decreased disposal charges. It is a measure of how cost efficiently different systems divert wastes, and distinguishes high cost, inefficient systems.
Total System Cost	1	Total System Cost is ranked highest because it compares the overall cost of different systems, both diversion and disposal, which allows the cost benefits of high diversion systems (with decreased disposal) to be considered.
1. A ranking of "1" represents the criterion considered to be the most important		

The following mitigation activities are possible and should be considered in the design of IC&I Systems:

- all equipment and systems should be maintained in good working order, and should be replaced with state-of-the-art approaches when appropriate;
- economies of scale should be utilized wherever possible;
- collection frequency could be altered when appropriate;
- the degree of source separation and segregation of materials collected could be varied;
- new technologies could be used for collection, processing and end uses;
- promotion/education should be increased to encourage participation and compliance with regulations; and
- staff training should be increased to enhance productivity.

Such mitigation measures would result in the efficient implementation and operation of all systems. The costs used in the analysis reflect conservative values and may decrease over time.

9.3 Assessment and Evaluation of Residential Systems

This section summarizes the comparative evaluation of residential systems presented in the Cost Discipline Net Effects Tables.

9.3.1 Residential Systems Ranking for Region of Durham

Table 9.2 presents a comparative evaluation of residential systems and overall residential system ranking for Region of Durham based on the total system (diversion plus disposal) cost per household in the year 2000. The system ranking is discussed below.

Systems 1 to 4 ranked equally as highest, with system costs (measured as costs/household/year) in the \$117 to \$126/household/year range at disposal rates of \$50/tonne, and in the \$150 to \$154/household/year range at disposal rates of \$100/tonne. Because the cost/household/year of these systems varies by less than \$10, they are considered equally ranked.

System 5 Wet/Dry was ranked second highest, at costs of \$142 to \$163/household/year for disposal rates of \$50 to \$100/tonne

System 6, Mixed Waste Processing, was ranked lowest, with overall system costs of \$173 to \$184/household/year, if the mixed waste system produces high quality compost, and \$176 to \$196/household/year if the system produces a low quality compost (i.e. greater quantities of material from the mixed waste processing and composting plant are landfilled due to product quality limitations).

Table 9.2 presents the system rankings for the Cost Criteria Grouping which are also summarized as follows:

Highest ranked	System 1 - Existing
Highest ranked	System 2 - Existing/Committed
Highest ranked	System 3 - Direct Cost
Highest ranked	System 4 - Expanded Blue Box
Second highest ranked	System 5 - Wet/Dry
Lowest ranked	System 6B - Mixed Waste Processing (high quality compost)
	System 6A - Mixed Waste Processing (low quality compost)

9.3.2 Residential Systems Ranking for Metro Toronto

Table 9.3 presents a comparative evaluation of residential systems and overall residential system ranking for Metro Toronto based on the system cost per household per year in the year 2000. The system ranking is discussed below.

Systems 1 to 5 (Existing, Existing/Committed, Direct Cost, Expanded Blue Box Wet/Dry) ranked equally as highest, with system costs (measured as cost/household/year) in the \$139 to \$145/household/year range, at disposal costs of \$50/tonne, and \$174 to \$187/hh/year at disposal costs of \$100/tonne. Because system costs do not differ by more than \$10/household/year at both the \$50/tonne and \$100/tonne disposal rates, these systems are all ranked equally.

System 5 (Wet/Dry) had the lowest cost (\$174/household/year), at a disposal rate of \$100/tonne, but had similar costs, at \$141/household/year, at a disposal rate of \$50/tonne.

System 6 (Mixed Waste Processing) was ranked the lowest, with overall system costs of \$196 to \$213/household/year if the mixed waste system produces a high quality compost, and \$204 to \$232/household/year if low quality compost is produced (i.e. greater quantities of material from the mixed waste processing and composting plant are landfilled due to product quality limitations).

Table 9.3 presents the system rankings for the Cost Criteria Grouping which are:

Highest ranked	System 1 - Existing
Highest ranked	System 2 - Existing/Committed
Highest ranked	System 3 - Direct Cost
Highest ranked	System 4 - Expanded Blue Box
Highest ranked	System 5 - Wet/Dry
Lowest ranked	System 6B - Mixed Waste Processing (high quality compost)
	System 6A - Mixed Waste Processing (low quality compost)

TABLE 9.2

REGION OF DURHAM
COMPARATIVE EVALUATION OF RESIDENTIAL SYSTEMS FOR COST

Goal/Criteria Group/Criteria	System 1 Existing	System 2 Existing Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6A Mixed Waste Processing (Low Quality Compost)	System 6B Mixed Waste Processing (High Quality Compost)
COST:							
COST	Highest	Highest	Highest	Highest	Second Highest	Lowest	Lowest
System cost per household per year (diversion plus disposal)	Highest due to: • \$117 to \$153/hh/yr	Highest due to: • \$119 to \$153/hh/yr	Highest due to: • \$122 to \$150/hh/yr	Highest due to: • \$126 to \$154/hh/yr	Second highest due to: • \$142 to \$163/hh/yr	Lowest due to: • \$176 to \$196/hh/yr	Lowest due to: • \$173 to \$184/hh/yr

TABLE 9.3
METRO TORONTO
COMPARATIVE EVALUATION OF RESIDENTIAL SYSTEMS FOR COST

Goal/Criteria Group/Criteria	System 1 Existing	System 2 Existing Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6B Mixed Waste Processing (High Quality Compost)	System 6A Mixed Waste Processing (Low Quality Compost)
COST:							
COST	Highest	Highest	Highest	Highest	Highest	Lowest	Lowest
System cost per household per year (diversion plus disposal)	Highest due to: • \$139 \$187/td/yr	Highest due to: • \$140 \$186/td/yr	Highest due to: • \$141 \$182/td/yr	Highest due to: • \$145 \$185/td/yr	Highest due to: • \$141 \$174/td/yr	Lowest due to: • \$196 \$213/td/yr	Lowest due to: • \$204 \$232/td/yr

9.3.3 Residential Systems Ranking for Region of York

Table 9.4 presents a comparative evaluation of residential systems and overall residential system ranking for Region of York based on the system cost per household per year in the year 2000. The system ranking is discussed below.

Systems 1 to 4 ranked equally as highest, with system costs (measured as cost/household/year) in the \$126 to \$130/household/year range, if disposal costs are \$50/tonne, and \$160 to \$173/household/year if disposal costs are \$100/tonne. Because system costs do not differ by more than \$10/household/year at both the \$50/tonne and \$100/tonne disposal rates, these systems are all ranked equally.

System 5, Wet/Dry, is ranked second highest with system costs of \$149 to \$175/household/year at disposal rates of \$50 to \$100/tonne respectively.

System 6, Mixed Waste Processing, was ranked the lowest, with an overall system costs of \$188 to \$202/household/year, if the mixed waste processing system produces a high quality compost, and \$194 to \$218/household/year if low quality compost is produced (i.e. greater quantities of material from the mixed waste processing and composting plant are landfilled due to product quality limitations).

In summary, system ranking for the Cost criteria group is as follows:

Highest ranked	System 1 - Existing
Highest ranked	System 2 - Existing/Committed
Highest ranked	System 3 - Direct Cost
Highest ranked	System 4 - Expanded Blue Box
Second highest ranked	System 5 - Wet/Dry
Lowest ranked	System 6B - Mixed Waste Processing (high quality compost)
	System 6A - Mixed Waste Processing (low quality compost)

9.3.4 Residential Systems Ranking for Region of Peel

Table 9.5 presents a comparative evaluation of residential systems and overall system ranking for Region of Peel based on total system cost per household per year (diversion plus disposal) in the year 2000. The system ranking is discussed below.

Systems 1 to 4 ranked equally as highest, with system costs (measured as costs/household/year) in the \$126 to \$136/household/year range. System 5 (Wet/Dry) was ranked second highest, with system costs (diversion plus disposal) of \$157 to \$188/household/year at disposal rates of \$50/tonne and \$100/tonne respectively. System 6, Mixed Waste Processing, was ranked lowest, with overall system costs of \$203 to \$219/household/year, if the Mixed Waste Processing system produces a high quality compost, and \$206 to \$235/household/year if the compost quality is poor (i.e. greater quantities of material from the mixed waste plant are landfilled due to product quality limitations).

TABLE 9.4

REGION OF YORK
COMPARATIVE EVALUATION OF RESIDENTIAL SYSTEMS FOR COST

Goal/Criteria Group/Criteria	System 1 Existing	System 2 Existing Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6B Mixed Waste Processing (High Quality Compost)	System 6A Mixed Waste Processing (Low Quality Compost)
COST:							
COST	Highest	Highest	Highest	Highest	Second highest	Lowest	Lowest
System cost per household per year (diversion plus disposal)	Highest due to: • \$130-\$173/hh/yr	Highest due to: • \$130-\$173/hh/yr	Highest due to: • \$126-\$160/hh/yr	Highest due to: • \$127-\$161/hh/yr	Second highest due to: • \$149-\$175/hh/yr	Lowest due to: • \$188-\$202/hh/yr	Lowest due to: • \$194-\$218/hh/yr

TABLE 9.5

REGION OF PEEL
COMPARATIVE EVALUATION OF RESIDENTIAL SYSTEMS FOR COST

Goal/Criteria Group/Criteria	System 1 Existing	System 2 Existing Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6B Mixed Waste Processing (High Quality Compost)	System 6A Mixed Waste Processing (Low Quality Compost)
COST:							
COST	Highest	Highest	Highest	Highest	Second Highest	Lowest	Lowest
System cost per household per year (diversion plus disposal)	Highest due to: • \$126-\$178/hh/yr	Highest due to: • \$129-\$177/hh/yr	Highest due to: • \$133-\$174/hh/yr	Highest due to: • \$136-\$175/hh/yr	Second highest due to: • \$157-\$188/hh/yr	Lowest due to: • \$203-\$219/hh/yr	Lowest due to: • \$206-\$235/hh/yr

In summary, system ranking for the Cost criteria group is as follows:

Highest ranked	System 1 - Existing
Highest ranked	System 2 - Existing/Committed
Highest ranked	System 3 - Direct Cost
Highest ranked	System 4 - Expanded Blue Box
Second highest ranked	System 5 - Wet/Dry
Lowest ranked	System 6B - Mixed Waste Processing (high quality compost)
	System 6A - Mixed Waste Processing (low quality compost)

9.4 Ranking of IC&I Systems for the GTA

Table 9.6 presents a comparative evaluation of GTA IC&I Systems and summarizes system ranking by cost criterion and overall system ranking for the GTA. The system ranking is discussed below for the two cost criteria used for IC&I systems evaluation. Overall IC&I system ranking for cost is discussed at the end of this section.

Total Waste Management System Cost

The total waste management system costs vary depending on the disposal rate chosen for the analysis. As discussed in Chapter 8, the total system cost analysis was carried out for three disposal rates for the IC&I system analysis. These disposal rates were \$50/tonne, \$85/tonne, and \$100/tonne.

At a disposal rate of \$50/tonne, the difference in total system cost between System 1 and System 6 is somewhat significant. At this disposal rate, total system costs range from \$335 million/year for System 1 to \$430 million for System 6, therefore System 6 costs 28% more than System 1. The costs of Systems 2 to 5 vary from \$338 million/year to \$358 million/year at this disposal rate.

At a disposal rate of \$100/tonne, the costs of Systems 1 and 2 are highest, at \$451 million/year, whereas the costs of the other systems vary from \$422 million/year for System 5 to \$437 million/year for System 3. Within the accuracy of the estimate, all of these costs are considered equal.

At a disposal rate of \$85/tonne, system costs vary from the lowest system cost of \$403 million/year for System 5, to \$430 million/year for System 6. Again, within the accuracy of the estimate, these costs are considered equal.

The above analysis shows that Total System Costs are sensitive to low disposal charges. Where a low disposal charge of \$50/tonne is assumed, high diversion systems have overall higher system costs, and would be ranked lower than low diversion systems from an overall cost point of view. As disposal charges increase, high diversion systems are comparatively less costly. At a disposal rate of \$100/tonne, systems which divert low quantities of waste are more costly than high diversion systems.

Because of the uncertainty regarding future disposal charges in the GTA, which impact on the comparative costs of IC&I 3Rs systems, and considering the limitations of the approach used for cost estimation, the quality of the available data on which the analysis was carried out, and the accuracy of the estimate, the costs of IC&I systems should be considered within

TABLE 9.6

**GREATER TORONTO AREA
COMPARATIVE EVALUATION OF IC&I SYSTEMS FOR COST**

Goal/Criteria Group/Criteria	IC&I System 1 Existing	IC&I System 2 Existing/ Committed	IC&I System 3 Extended JRs Regulations	IC&I System 4 Expanded JRs Regulations	IC&I System 5 Expanded JRs Regulations with Organics	IC&I System 6 No Unprocessed Waste to Landfill
COST:						
Cost	Highest	Highest	Highest	Highest	Highest	Highest
Diversion Cost (\$ per tonne diverted)	Highest due to: <ul style="list-style-type: none">• \$112/tonne	Highest due to: <ul style="list-style-type: none">• \$114 to \$116/tonne	Highest due to: <ul style="list-style-type: none">• \$117/tonne	Highest due to: <ul style="list-style-type: none">• \$120/tonne	Highest due to: <ul style="list-style-type: none">• \$117/tonne	Lowest due to: <ul style="list-style-type: none">• \$215/tonne
Total System Cost (\$/year)	Highest due to: <ul style="list-style-type: none">• \$335 million (disposal \$50/tonne)• \$416 million (disposal \$85/tonne)• \$451 million (disposal \$100/tonne)	Highest due to: <ul style="list-style-type: none">• \$338-\$341 million (disposal \$50/tonne)• \$416-\$417 million (disposal \$85/tonne)• \$448-\$451 million (disposal \$100/tonne)	Highest due to: <ul style="list-style-type: none">• \$349 million (disposal \$50/tonne)• \$411 million (disposal \$85/tonne)• \$437 million (disposal \$100/tonne)	Highest due to: <ul style="list-style-type: none">• \$359 million (disposal \$50/tonne)• \$411 million (disposal \$85/tonne)• \$434 million (disposal \$100/tonne)	Highest due to: <ul style="list-style-type: none">• \$358 million (disposal \$50/tonne)• \$403 million (disposal \$85/tonne)• \$422 million (disposal \$100/tonne)	Highest due to: <ul style="list-style-type: none">• \$430 million (disposal \$50/tonne)• \$430 million (disposal \$85/tonne)• \$430 million (disposal \$100/tonne)

the same range for all disposal rates, therefore the six IC&I systems are ranked equally as highest.

Cost per tonne diverted.

For the indicator cost per tonne diverted, there is very little difference between Systems 1, 2, 3, 4, and 5. The costs per tonne diverted for these five systems range from \$112/tonne to \$120/tonne. Within the accuracy of these calculations, these are considered virtually the same. All of these systems were therefore ranked as highest.

System 6 has the highest cost per tonne diverted of all six systems, at \$215/tonne, and was therefore ranked lowest. It should be noted that if there is a high degree of source separation achieved within this system it is expected that the cost would decrease.

Overall IC&I System Ranking for Cost

In overall system ranking, total waste management system cost was considered the most important criterion, while the cost per tonne diverted was used to differentiate between systems, if necessary. On this basis, Systems 1 through 6 were ranked as highest, due to similar overall system costs.

10.0 SUMMARY OF NET EFFECTS

The results of the assessment and evaluation of the residential 3Rs systems with respect to cost are summarized in Table 10.1 for the four Regions.

10.1 Residential Systems

The Existing, Existing/Committed, Direct Cost and Expanded Blue Box Systems were ranked equally at highest for cost in all GTA regions. When the costs of various diversion programs were combined with disposal charges which would be incurred by each system at assumed disposal rates of \$50/tonne and \$100/tonne, the difference in total system costs per household for each of these four systems in any one Region was less than \$10/household/year. They were therefore always ranked equally as highest.

In all Regions, the Mixed Waste Processing Systems (both high quality and low quality compost) were ranked as lowest, as they had costs which were higher than Systems 1 to 4.

For the Regions of Durham, York and Peel, the Wet/Dry System (System 5) was ranked second highest, as it had costs which were higher than for Systems 1 to 4, but were lower than System 6 costs.

In Metro Toronto, the Wet/Dry System was ranked equally with Systems 1 to 4, as its' costs were similar, and in fact were lower than costs for Systems 1 to 4 at disposal rates of \$100/tonne. The reason for the different ranking of the Wet/Dry System with respect to cost in Metro Toronto is because a Wet/Dry system would replace the current Blue Box collection cost of \$169/tonne with a Wet/Dry collection cost of \$77/tonne. In other Regions where Blue Box collection costs were lower than in Metro Toronto, the cost impacts of moving to a three-stream Wet/Dry collection system from the Existing system are less pronounced.

10.2 IC&I Systems

All IC&I systems were ranked equally for cost. The differences between systems were minimal at higher disposal rates, and were more pronounced at lower disposal rates. Because of the uncertainty regarding disposal rates to be charged in GTA in the future, the systems were considered equally ranked by the cost discipline.

TABLE 10.1

SUMMARY OF RESIDENTIAL JRS SYSTEM RANKINGS BY REGION
COST

Region	System 1 Existing	System 2 Existing Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6 Mixed Waste Processing
Durham	Highest ranked	Highest ranked	Highest ranked	Highest ranked	Second highest ranked	Lowest ranked
Metro Toronto	Highest ranked	Highest ranked	Highest ranked	Highest ranked	Highest ranked	Lowest ranked
York	Highest ranked	Highest ranked	Highest ranked	Highest ranked	Second highest ranked	Lowest ranked
Peel	Highest ranked	Highest ranked	Highest ranked	Highest ranked	Second highest ranked	Lowest ranked

SCHEDULE A
RESIDENTIAL AND IC&I SYSTEM
COMPONENTS

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Table A.1

Region of Durham

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities Collection of residential garbage from multi-family units by municipal forces or private contractors. Self haul of waste to landfills and transfer stations by residents Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities Collection of residential garbage from multi-family units by municipal forces or private contractors. Self haul of waste to landfills and transfer stations by residents Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities Direct cost system for garbage collection Collection of residential garbage from multi-family units by municipal forces or private contractors. Self haul of waste to landfills and transfer stations by residents Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities Collection of residential garbage from multi-family units by municipal forces or private contractors. Self haul of waste to landfills and transfer stations by residents Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection <ul style="list-style-type: none"> Curbside collection of residential waste from single family dwellings in three streams by specially designed trucks by municipal forces or contractors to municipalities Collection of residential garbage from multi-family units in three streams by municipal forces or private contractors where feasible Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads Self haul of waste to landfills and transfer stations by residents 	Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities Collection of residential garbage from multi-family units by municipal forces or private contractors. Self haul of waste to landfills and transfer stations by residents Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads
Residential Recycling and Collection <ul style="list-style-type: none"> Curbside collection of Blue Box materials from single family dwellings. Materials include ONP, OCC, telephone directories, OCC, PET, HDPE, glass, ferrous, aluminum. Collection of bins of recyclables from multi-family units 	Residential Recycling and Collection <ul style="list-style-type: none"> Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations Curbside collection of additional dry materials Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations) Collection of bins of recyclables from multi-family units 	Residential Recycling and Collection <ul style="list-style-type: none"> Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations Curbside collection of increased quantities of dry materials following implementation of Direct Cost system for garbage collection Recycling services at all multi-family buildings with 6 or more units. Collection of bins of recyclables from multi-family units 	Residential Recycling and Collection <ul style="list-style-type: none"> Curbside collection of Expanded Blue Box materials including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, cardboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles Recycling services for full range of Expanded Blue Box materials at all multi-family buildings with 6 or more units Collection of bins of recyclables (collecting all Expanded Blue Box materials) from multi-family units 	Residential Recycling and Collection <ul style="list-style-type: none"> Provide carts to all single family households Separation of waste into three streams (wet, dry, and garbage) by the household Expanded set of dry materials to be collected, including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, cardboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles Recycling services at all multi-family buildings with 6 or more units Large bins provided in the garbage management area of multi-family buildings. Residents will be encouraged to separate their waste into three separate bags 	Residential Recycling and Collection <ul style="list-style-type: none"> Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations Curbside collection of additional dry materials Recycling services at all multi-family buildings with 6 or more units Collection of bins of recyclables from multi-family units

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Table A.1

Region of Durham
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depots for multi-family residents not serviced by recycling Drop-off depot for rural households. Drop-off depots for recyclables (scrap metal, batteries, brush, drywall, HHW, tires, OCC and textiles) Depots located at transfer stations to provide recycling opportunities to self-haul generators. 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depots for multi-family residents not serviced by recycling Drop-off depot for rural households Drop-off depots for recyclables (scrap metal, batteries, brush, drywall, HHW, tires, OCC and textiles) Depots located at transfer stations to provide recycling opportunities to self-haul generators. 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depots for multi-family residents not serviced by recycling Drop-off depot for rural households Drop-off depots for recyclables (scrap metal, batteries, brush, drywall, HHW, tires, OCC and textiles) Depots located at transfer stations to provide recycling opportunities to self-haul generators. 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> <i>Drop-off depots for multi-family residents not serviced by recycling (collecting all Expanded Blue Box materials)</i> <i>Drop-off depot for rural households (collecting all Expanded Blue Box materials)</i> Drop-off depots for recyclables (scrap metal, batteries, brush, drywall, HHW, tires, OCC and textiles) Depots located at transfer stations to provide recycling opportunities to self-haul generators. 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depots for multi-family residents not serviced by recycling Drop-off depot for rural households Drop-off depots for recyclables (scrap metal, batteries, brush, drywall, HHW, tires, OCC and textiles) Depots located at transfer stations to provide recycling opportunities to self-haul generators 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depots for multi-family residents not serviced by recycling Drop-off depot for rural households Drop-off depots for recyclables (scrap metal, batteries, brush, drywall, HHW, tires, OCC and textiles) Depots located at transfer stations to provide recycling opportunities to self-haul generators.
Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste. Drop-off depots for leaf and yard waste 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste Drop-off depots for leaf and yard waste 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste. Drop-off depots for leaf and yard waste 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste Drop-off depots for leaf and yard waste 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> <i>Collection of leaf and yard waste as part of three stream pick-up</i> <i>Separate brush collection</i> Drop-off depots for leaf and yard waste 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste Drop-off depots for leaf and yard waste
Residential Household Composting <ul style="list-style-type: none"> Backyard composter distribution programs (22,450 composters by end of 1992) Limited community composting Limited vermicomposting 4,000 planned (cap budget) 	Residential Household Composting <ul style="list-style-type: none"> Backyard composter distribution programs (26,450 composters by end of 1992) Limited community composting Limited vermicomposting 	Residential Household Composting <ul style="list-style-type: none"> <i>Door to door distribution of backyard composters to 80% of single family households</i> <i>Large 3-bin composting units distributed to apartment and co-operative housing complexes</i> <i>Promotion of vermicomposting to multi-family units</i> <i>Promotion of community composting</i> 	Residential Household Composting <ul style="list-style-type: none"> <i>Door to door distribution of backyard composters to 80% of single family households.</i> <i>Large 3-bin composting units distributed to apartment and co-operative housing complexes</i> <i>Promotion of vermicomposting to multi-family units</i> <i>Promotion of community composting</i> 	Residential Household Composting <ul style="list-style-type: none"> <i>Door to door distribution of backyard composters to 80% of single family households.</i> <i>Large 3-bin composting units distributed to apartment and co-operative housing complexes</i> <i>Promotion of vermicomposting to multi-family units</i> <i>Promotion of community composting</i> 	Residential Household Composting <ul style="list-style-type: none"> <i>Door to door distribution of backyard composters to 80% of single family households.</i> <i>Large 3-bin composting units distributed to apartment and co-operative housing complexes</i> <i>Promotion of vermicomposting to multi-family units</i> <i>Promotion of community composting</i>

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Table A.1

Region of Durham

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Permanent drop-off depots for household hazardous waste (HHW) at Brock West Landfill, and Scugog and Oshawa transfer stations Toxic Taxi service (discontinued in fall 1992) 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Permanent drop-off depots for household hazardous waste (HHW) at Brock West Landfill, and Scugog and Oshawa transfer stations 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Permanent drop-off depots for household hazardous waste (HHW) at Brock West Landfill, and Scugog and Oshawa transfer stations 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Permanent drop-off depots for household hazardous waste (HHW) at Brock West Landfill, and Scugog and Oshawa transfer stations 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods , etc.).</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Permanent drop-off depots for household hazardous waste (HHW) at Brock West Landfill, and Scugog and Oshawa transfer stations 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).</p> <ul style="list-style-type: none"> Special curbside collection of Christmas trees Permanent drop-off depots for household hazardous waste (HHW) at Brock West Landfill, and Scugog and Oshawa transfer stations
<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste. 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Existing centralized windrow leaf and yard waste composting facilities may be closed Central composting facility (in vessel) for composting of source separated household organics (wet stream) and leaf and yard waste 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste New mixed waste processing and composting facility
<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Goodwill trailers throughout region Attended donation centre at Riston transfer station 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Goodwill trailers throughout region Attended donation centre at Riston transfer station 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Goodwill trailers throughout region Attended donation centre at Riston transfer station 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Goodwill trailers throughout region Attended donation centre at Riston transfer station 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Goodwill trailers throughout region Attended donation centre at Riston transfer station 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Goodwill trailers throughout region Attended donation centre at Riston transfer station
<p>MRFs</p> <ul style="list-style-type: none"> One processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/ institutional) sector. Owned by the municipality and operated by municipal staff. Construct new MRF to handle 20-year requirements Close existing MRF when new MRF constructed 	<p>MRFs</p> <ul style="list-style-type: none"> One processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/ institutional) sector. Owned by the municipality and operated by municipal staff Improvements/expansion to the existing regional MRF Construct new MRF to handle 20-year requirements Close existing MRF when new MRF constructed 	<p>MRFs</p> <ul style="list-style-type: none"> One processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/ institutional) sector. Owned by the municipality and operated by municipal staff Construct new MRF, to process larger stream of dry recyclables Close existing MRF when new MRF constructed 	<p>MRFs</p> <ul style="list-style-type: none"> One processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/ institutional) sector. Owned by the municipality and operated by municipal staff Construct new MRF, to process larger stream of dry recyclables Close existing MRF when new MRF constructed 	<p>MRFs</p> <ul style="list-style-type: none"> Processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/institutional) sector. Owned by the municipality and operated by municipal or contractors' staff. Construct new MRF, to process larger dry stream of recyclables Close existing MRF when new MRF constructed 	<p>MRFs</p> <ul style="list-style-type: none"> One processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/ institutional) sector. Owned by the municipality and operated by municipal staff Construct new MRF to process larger stream of dry recyclables Close existing MRF when new MRF constructed

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Table A.1

Region of Durham

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Promotion and Education	Residential Promotion and Education	Residential Promotion and Education	Residential Promotion and Education	Residential Promotion and Education	Residential Promotion and Education
<ul style="list-style-type: none"> • 3Rs promotion and education program, focused on the residential sector, including home composting video • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. 	<ul style="list-style-type: none"> • 3Rs promotion and education program, focused on the residential sector, including home composting video • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. 	<ul style="list-style-type: none"> • 3Rs promotion and education program, focused on the residential sector, including home composting video • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • 3Rs promotion and education program, focused on source reduction, pre-cycling, reuse and recycling • Promotion/education program on direct cost system 	<ul style="list-style-type: none"> • 3Rs promotion and education program, focused on the residential sector, including home composting video • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • 3Rs promotion and education program, focused on source reduction, pre-cycling, reuse and recycling • Promotion/education program on Expanded Blue Box program 	<ul style="list-style-type: none"> • 3Rs promotion and education program, focused on the residential sector, including home composting video • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • 3Rs promotion and education program, focused on source reduction, pre-cycling, reuse and recycling • Promotion/education program for wet/dry system 	<ul style="list-style-type: none"> • 3Rs promotion and education program, focused on the residential sector, including home composting video • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • 3Rs promotion and education program, focused on source reduction, pre-cycling, reuse and recycling

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Table A.2

Metro Toronto

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings Collection of residential garbage from multi-family units by municipal forces or private contractors Self-haul of waste to landfills and transfer stations by residents Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings Collection of residential garbage from multi-family units by municipal forces or private contractors Self-haul of waste to landfills and transfer stations by residents Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings Collection of residential garbage from multi-family units by municipal forces or private contractors <i>Direct cost system for garbage collection from households currently serviced by municipal forces</i> Self-haul of waste to landfills and transfer stations by residents Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings Collection of residential garbage from multi-family units by municipal forces or private contractors Self-haul of waste to landfills and transfer stations by residents Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> <i>Curbside collection of residential waste from single family dwellings in three streams by specially designed trucks</i> <i>Collection of residential garbage from multi-family units in three streams by municipal forces or private contractors, where feasible</i> Self-haul of waste to landfills and transfer stations by residents Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings Collection of residential garbage from multi-family units by municipal forces or private contractors Self-haul of waste to landfills and transfer stations by residents Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads
Residential Recycling and Collection <ul style="list-style-type: none"> Curbside collection of Blue Box materials from single family dwellings and some apartment buildings. Typical materials include ONP, OCC, telephone directories, magazines, PET, HDPE, glass, ferrous, aluminum Collection of bins of recyclables from multi-family units 	Residential Recycling and Collection <ul style="list-style-type: none"> <i>Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations</i> <i>Curbside collection of additional dry materials</i> <i>Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations)</i> Collection of bins of recyclables from multi-family units <i>Some additional recycling service to multi-family units</i> 	Residential Recycling and Collection <ul style="list-style-type: none"> Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations Curbside collection of additional dry materials Recycling services at all multi-family buildings with 6 or more units Collection of bins of recyclables from multi-family units 	Residential Recycling and Collection <ul style="list-style-type: none"> <i>Curbside collection of Expanded Blue Box materials including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, boxboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles</i> <i>Recycling services for full range of Expanded Blue Box materials at all multi-family buildings with 6 or more units</i> <i>Collection of bins of recyclables (collecting all Expanded Blue Box materials) from multi-family units</i> <i>Collection of bins of recyclables (collecting all expanded blue box materials) from multi-family units.</i> 	Residential Recycling and Collection <ul style="list-style-type: none"> <i>Provide carts to all single family households.</i> <i>Separation of waste into three streams (wet, dry and garbage) by the householder.</i> <i>Expanded set of dry materials to be collected, including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, boxboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles</i> Recycling services at all multi-family buildings with 6 or more units <i>Large bins provided in the garbage management area of multi-family buildings, where space permits. Residents will be encouraged to separate their waste into three separate bags</i> 	Residential Recycling and Collection <ul style="list-style-type: none"> Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations Curbside collection of additional dry materials Recycling services at all multi-family buildings with 6 or more units Collection of bins of recyclables from multi-family units Some additional recycling service to multi-family units

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Table A.2

Metro Toronto

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depot for dry recyclables (including all banned materials) at landfills Depots located at transfer stations to provide recycling opportunities to self-haul generators Igloos and domes provide opportunities to recycle in public areas Drop-off depots for multi-family residents not serviced by recycling Depots for voluntary recycling by residents (e.g. Scarborough) 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depot for dry recyclables (including all banned materials) at landfills Depots located at transfer stations to provide recycling opportunities to self-haul generators Igloos and domes provide opportunities to recycle in public areas Drop-off depots for multi-family residents not serviced by recycling Depots for voluntary recycling by residents (e.g. Scarborough) 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depot for dry recyclables (including all banned materials) at landfills Depots located at transfer stations to provide recycling opportunities to self-haul generators Igloos and domes provide opportunities to recycle in public areas Drop-off depots for multi-family residents not serviced by recycling Depots for voluntary recycling by residents (e.g. Scarborough) 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depot for dry recyclables (including all banned materials) at landfills Depots located at transfer stations to provide recycling opportunities to self-haul generators (<i>collecting all Expanded Blue Box materials</i>) Igloos and domes provide opportunities to recycle in public areas Drop-off depots for multi-family residents not serviced by recycling, for full range of Expanded Blue Box materials. Depots for voluntary recycling by residents (e.g. Scarborough) 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depot for dry recyclables (including all banned materials) at landfills Depots located at transfer stations to provide recycling opportunities to self-haul generators (<i>collecting all Expanded Blue Box materials</i>) Igloos and domes provide opportunities to recycle in public areas Drop-off depots for multi-family residents not serviced by recycling Depots for voluntary recycling by residents (e.g. Scarborough) 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depot for dry recyclables (including all banned materials) at landfills Depots located at transfer stations to provide recycling opportunities to self-haul generators Igloos and domes provide opportunities to recycle in public areas Drop-off depots for multi-family residents not serviced by recycling Depots for voluntary recycling by residents (e.g. Scarborough)
Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste New leaf and yard waste bunkers at transfer stations (1994 capital budget) 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste New leaf and yard waste bunkers at transfer stations (1994 capital budget) 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste New leaf and yard waste bunkers at transfer stations (1994 capital budget) 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Collection of leaf and yard waste as part of three stream pick-up Separate brush collection New leaf and yard waste bunkers at transfer stations (1994 capital budget) 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste. New leaf and yard waste bunkers at transfer stations (1994 capital budget)
Residential Household Composting <ul style="list-style-type: none"> Backyard composter distribution programs (105,000 units to date) Sale of 3-bin units to some multi-family dwellings at \$150 each (25 units by end of 1992) Limited community composting Limited vermicomposting 	Residential Household Composting <ul style="list-style-type: none"> Backyard composter distribution programs (105,000 units to date) Distribution of an additional 15,000 to 20,000 backyard composters, to bring the total distributed by Metro to between 120,000 and 125,000. Sale of 3-bin units to some multi-family dwellings at \$150 each (25 units by end of 1992) Additional community composting Additional vermicomposting 	Residential Household Composting <ul style="list-style-type: none"> Door to door distribution of backyard composters to 80% of single family households. Large 3-bin composting units distributed to apartment and co-operative housing complexes Promotion of vermicomposting to multi-family units Promotion of community composting 	Residential Household Composting <ul style="list-style-type: none"> Door to door distribution of backyard composters to 80% of single family households. Large 3-bin composting units distributed to apartment and co-operative housing complexes Promotion of vermicomposting to multi-family units Promotion of community composting 	Residential Household Composting <ul style="list-style-type: none"> Door to door distribution of backyard composters to 80% of single family households. Large 3-bin composting units distributed to apartment and co-operative housing complexes on a voluntary basis. Promotion of vermicomposting to multi-family units Promotion of community composting 	Residential Household Composting <ul style="list-style-type: none"> Door to door distribution of backyard composters to 80% of single family households. Large 3-bin composting units distributed to apartment and co-operative housing complexes. Promotion of vermicomposting to multi-family units Promotion of community composting

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Table A.2

Metro Toronto

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Curbside collection of white goods Drop-off depots for white goods Ten (10) permanent drop-off depots for HHW (8 in Metro, 1 at Keele Valley Landfill, one at Brock Road West landfill.) Two Toxic Taxis 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Curbside collection of white goods Drop-off depots for white goods Ten (10) permanent drop-off depots for HHW (8 in Metro, 1 at Keele Valley Landfill, one at Brock Road West landfill.) Two Toxic Taxis 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Curbside collection of white goods Drop-off depots for white goods Ten (10) permanent drop-off depots for HHW (8 in Metro, 1 at Keele Valley Landfill, one at Brock Road West landfill.) Two Toxic Taxis 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Curbside collection of white goods Drop-off depots for white goods Ten (10) permanent drop-off depots for HHW (8 in Metro, 1 at Keele Valley Landfill, one at Brock Road West landfill.) Two Toxic Taxis 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Curbside collection of white goods Drop-off depots for white goods Ten (10) permanent drop-off depots for HHW (8 in Metro, 1 at Keele Valley Landfill, one at Brock Road West landfill.) Two Toxic Taxis 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods, etc.).</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Curbside collection of white goods Drop-off depots for white goods Ten (10) permanent drop-off depots for HHW (8 in Metro, 1 at Keele Valley Landfill, one at Brock Road West landfill.) Two Toxic Taxis
<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste in North York (3 sites), Scarborough (1 site), Etobicoke (1 site), and at Keele Valley (Metro operated Avondale Site) 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste in North York (3 sites), Scarborough (1 site), Etobicoke (1 site), and at Keele Valley (Metro operated Avondale Site). 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste in North York (3 sites), Scarborough (1 site), Etobicoke (1 site), and at Keele Valley (Metro operated Avondale Site). 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste in North York (3 sites), Scarborough (1 site), Etobicoke (1 site), and at Keele Valley (Metro operated Avondale Site). 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Existing centralized windrow leaf and yard waste composting facilities may be closed One new central composting facility (in-vessel) with a capacity to process all household organics and leaf and yard wastes 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste in North York (3 sites), Scarborough (1 site), Etobicoke (1 site), and at Keele Valley (Metro operated Avondale Site). Two new mixed waste processing and composting facilities
<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Goods exchange days Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.). Food reuse organization (such as Second Harvest). Re-Use Centre in Scarborough 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Goods exchange days Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.). Food reuse organization (such as Second Harvest). Re-Use Centre in Scarborough 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Goods exchange days Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.). Food reuse organization (such as Second Harvest). Re-Use Centre in Scarborough 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Goods exchange days Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.). Food reuse organization (such as Second Harvest). Re-Use Centre in Scarborough 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Goods exchange days Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.). Food reuse organization (such as Second Harvest). Re-Use Centre in Scarborough 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Goods exchange days Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.). Food reuse organization (such as Second Harvest). Re-Use Centre in Scarborough

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Table A.2

Metro Toronto

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
MRFs <ul style="list-style-type: none"> • QUNO MRF on Commissioners Street, which processes fibres and container materials under contract to Metro in 1992. Operation changed in 1993 to process fibres only • CRinc MRF on Commissioners Street, which started operation in May 1992. It processes only container materials (plastic, metals, and glass). The facility is owned by Metro, and is operated under contract by CRinc • Dufferin Street MRF is owned by Metro and operated by QUNO • One new MRF (to meet 20 year requirement) 	MRFs <ul style="list-style-type: none"> • QUNO MRF on Commissioners Street, which processes fibres • CRinc MRF on Commissioners Street processes container materials (plastic, metals, and glass). The facility is owned by Metro, and is operated under contract by CRinc • Dufferin Street MRF is owned by Metro and operated by QUNO • One new MRF for processing dry recyclables to meet 20 year requirements 	MRFs <ul style="list-style-type: none"> • QUNO MRF on Commissioners Street, which processes fibres • CRinc MRF on Commissioners Street processes container materials (plastic, metals, and glass). The facility is owned by Metro, and is operated under contract by CRinc • Dufferin Street MRF is owned by Metro and operated by QUNO • One new MRF for processing dry recyclables (to meet 20 year requirement) 	MRFs <ul style="list-style-type: none"> • QUNO MRF on Commissioners Street, which processes fibres • CRinc MRF on Commissioners Street processes container materials (plastic, metals, and glass). The facility is owned by Metro, and is operated under contract by CRinc • Dufferin Street MRF is owned by Metro and operated by QUNO • One new MRF for processing dry recyclables (to meet 20 year requirement) 	MRFs <ul style="list-style-type: none"> • QUNO MRF on Commissioners Street, which processes fibres • CRinc MRF on Commissioners Street processes container materials (plastic, metals, and glass). The facility is owned by Metro, and is operated under contract by CRinc • Dufferin Street MRF is owned by Metro and operated by QUNO • One new MRF for processing dry recyclables (to meet 20 year requirement) 	MRFs <ul style="list-style-type: none"> • QUNO MRF on Commissioners Street, which processes fibres • CRinc MRF on Commissioners Street processes container materials (plastic, metals, and glass). The facility is owned by Metro, and is operated under contract by CRinc • Dufferin Street MRF is owned by Metro and operated by QUNO • One new MRF for processing dry recyclables (to meet 20 year requirement)
Residential Promotion and Education <ul style="list-style-type: none"> • Extensive promotion and education campaign on composting by the residential sector, which includes the Master Composter program operated for Metro by RCO, a compost information hotline, radio and newspaper advertisements, and backyard composting manuals in many languages • Extensive 3Rs promotion and education program, focused on the residential sector, which includes publishing "Your Guide to Reduction and Recycling in Metropolitan Toronto" • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. 	Residential Promotion and Education <ul style="list-style-type: none"> • Extensive promotion and education campaign on composting by the residential sector, which includes the Master Composter program operated for Metro by RCO, a compost information hotline, radio and newspaper advertisements, and backyard composting manuals in many languages • Extensive 3Rs promotion and education program, focused on the residential sector, which includes publishing "Your Guide to Reduction and Recycling in Metropolitan Toronto" • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. 	Residential Promotion and Education <ul style="list-style-type: none"> • Extensive promotion and education campaign on composting by the residential sector, which includes the Master Composter program operated for Metro by RCO, a compost information hotline, radio and newspaper advertisements, and backyard composting manuals in many languages • Extensive 3Rs promotion and education program, focused on the residential sector, which includes publishing "Your Guide to Reduction and Recycling in Metropolitan Toronto" • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • Promotion/education on Direct cost program • Promotion/education program on source reduction, pre-cycling, composting reuse and recycling 	Residential Promotion and Education <ul style="list-style-type: none"> • Extensive promotion and education campaign on composting by the residential sector, which includes the Master Composter program operated for Metro by RCO, a compost information hotline, radio and newspaper advertisements, and backyard composting manuals in many languages • Extensive 3Rs promotion and education program, focused on the residential sector, which includes publishing "Your Guide to Reduction and Recycling in Metropolitan Toronto" • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • Promotion/education on Expanded Blue Box program • Promotion/education program on source reduction, pre-cycling, composting reuse and recycling 	Residential Promotion and Education <ul style="list-style-type: none"> • Extensive promotion and education campaign on composting by the residential sector, which includes the Master Composter program operated for Metro by RCO, a compost information hotline, radio and newspaper advertisements, and backyard composting manuals in many languages • Extensive 3Rs promotion and education program, focused on the residential sector, which includes publishing "Your Guide to Reduction and Recycling in Metropolitan Toronto" • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • Promotion/education for wet/dry system • Promotion/education for source reduction, pre-cycling, composting, reuse and recycling 	Residential Promotion and Education <ul style="list-style-type: none"> • Extensive promotion and education campaign on composting by the residential sector, which includes the Master Composter program operated for Metro by RCO, a compost information hotline, radio and newspaper advertisements, and backyard composting manuals in many languages • Extensive 3Rs promotion and education program, focused on the residential sector, which includes publishing "Your Guide to Reduction and Recycling in Metropolitan Toronto" • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • Promotion/education for source reduction, pre-cycling, composting, reuse and recycling

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Table A.3

York Region

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Garbage Collection and Disposal <ul style="list-style-type: none"> • Curbside collection of residential garbage from single family dwellings • Collection of residential garbage from multi-family units by private contractors • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads • Limit on number of bags/containers set-out for garbage collection (King City) 	Garbage Collection and Disposal <ul style="list-style-type: none"> • Curbside collection of residential garbage from single family dwellings • Collection of residential garbage from multi-family units by private contractors • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads • Limit on number of bags/containers set-out for garbage collection 	Garbage Collection and Disposal <ul style="list-style-type: none"> • Curbside collection of residential garbage from single family dwellings • <i>Direct cost system for garbage collection</i> • Collection of residential garbage from multi-family units by private contractors • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads • Limit on number of bags/containers set-out for garbage collection 	Garbage Collection and Disposal <ul style="list-style-type: none"> • Curbside collection of residential garbage from single family dwellings • Collection of residential garbage from multi-family units by private contractors • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads • Limit on number of bags/containers set-out for garbage collection 	Garbage Collection <ul style="list-style-type: none"> • <i>Curbside collection of residential waste from single family dwellings in three streams by specially designed trucks by municipal forces or contractors to municipalities</i> • <i>Collection of residential garbage from multi-family units in three streams by municipal forces or private contractors, where feasible</i> • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads • Limit on number of bags/containers set-out for garbage collection 	Garbage Collection and Disposal <ul style="list-style-type: none"> • Curbside collection of residential garbage from single family dwellings • Collection of residential garbage from multi-family units by private contractors • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads • Limit on number of bags/containers set-out for garbage collection

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Table A.3

York Region

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Recycling and Collection <ul style="list-style-type: none"> • Curbside collection of dry recyclables by municipal forces or private contractors • Materials collected by different municipalities include: ONP, glass, steel, aluminum, PET, OCC, telephone directories, HDPE, rigid and other plastics • Assume collection of bins of recyclables from multi-family units (confirm) 	Residential Recycling and Collection <ul style="list-style-type: none"> • <i>Curbside collection of dry recyclables by municipal forces or private contractors</i> • <i>Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations</i> • <i>Curbside collection of additional dry materials</i> • <i>Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations)</i> • <i>Collection of bins of recyclables from multi-family units</i> 	Residential Recycling and Collection <ul style="list-style-type: none"> • Curbside collection of dry recyclables by municipal forces or private contractors • Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations • Curbside collection of additional dry materials • Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations) • Collection of bins of recyclables from multi-family units 	Residential Recycling and Collection <ul style="list-style-type: none"> • <i>Curbside collection of Expanded Blue Box materials including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, boxboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles</i> • <i>Recycling services for full range of Expanded Blue Box materials at all multi-family buildings with 6 or more units</i> • <i>Collection of bins of recyclables (collecting all Expanded Blue Box materials) from multi-family units</i> 	Residential Recycling and Collection <ul style="list-style-type: none"> • <i>Provide carts to all single family households and some "other" households</i> • <i>Separation of waste into three streams (wet, dry, and garbage) by the household</i> • <i>Expanded set of dry materials to be collected, including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, boxboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles</i> • <i>Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations)</i> • <i>Large bins provided in the garbage management area of multi-family buildings if space permits. Residents will be encouraged to separate their waste into three separate bags</i> 	Residential Recycling and Collection <ul style="list-style-type: none"> • Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations • Curbside collection of additional dry materials • Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations) • Collection of bins of recyclables from multi-family units
Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> • Assume drop-off depots for multi-family residents not serviced by recycling (confirm) • Assume drop-off depot for rural households (confirm) • Depot at Markham for boxboard, mixed paper, scrap metal and tires, in addition to Blue Box materials 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> • <i>Drop-off depots for multi-family residents not serviced by recycling</i> • <i>Some additional recycling service to multi-family units</i> • <i>Some additional recycling at new depots</i> • <i>Depot at Markham for boxboard, mixed paper, scrap metal and tires, in addition to Blue Box materials</i> 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> • Drop-off depots for multi-family residents not serviced by recycling • Some additional recycling service to multi-family units • Some additional recycling at new depots • Depot at Markham for boxboard, mixed paper, scrap metal and tires, in addition to Blue Box materials 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> • <i>Drop-off depots for multi-family residents not serviced by recycling (collecting all Expanded Blue Box materials)</i> • <i>Drop-off depot for rural households (collecting all Expanded Blue Box materials)</i> • <i>Depot at Markham for boxboard, mixed paper, scrap metal and tires, in addition to Blue Box materials</i> 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> • Drop-off depots for multi-family residents not serviced by recycling. • Drop-off depot for rural households. • Depot at Markham for boxboard, mixed paper, scrap metal and tires, in addition to Blue Box materials 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> • Drop-off depots for multi-family residents not serviced by recycling • Some additional recycling service to multi-family units • Some additional recycling at new depots • Depot at Markham for boxboard, mixed paper, scrap metal and tires, in addition to Blue Box materials

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Table A.3

York Region

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste Drop-off depot for leaf and yard waste at regions composting site - no charge to residents 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste Drop-off depot for leaf and yard waste at regions composting site - no charge to residents 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste Drop-off depot for leaf and yard waste at regions composting site - no charge to residents 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste Drop-off depot for leaf and yard waste at regions composting site - no charge to residents 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Collection of leaf and yard waste as part of three stream pick-up Separate brush collection 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste Drop-off depot for leaf and yard waste at regions composting site - no charge to residents
Residential Household Composting <ul style="list-style-type: none"> Backyard composter distribution programs (29,050 composters by end of 1992) Limited community composting Limited vermicomposting 	Residential Household Composting <ul style="list-style-type: none"> Backyard composter distribution programs (29,050 composters by end of 1992) Distribution of additional backyard composters by individual municipalities Additional community composting Additional vermicomposting 	Residential Household Composting <ul style="list-style-type: none"> Door to door distribution of backyard composters to 80% of single family households. Large 3-bin composting units distributed to apartment and co-operative housing complexes Promotion of vermicomposting to multi-family units Promotion of community composting 	Residential Household Composting <ul style="list-style-type: none"> Door to door distribution of backyard composters to 80% of single family households. Promotion of large 3-bin composting units distributed to apartment and co-operative housing complexes Promotion of vermicomposting to multi-family units Promotion of community composting 	Residential Household Composting <ul style="list-style-type: none"> Door to door distribution of backyard composters to 80% of single family households. Promotion of large 3-bin composting units distributed to apartment and co-operative housing complexes Promotion of vermicomposting to multi-family units Promotion of community composting 	Residential Household Composting <ul style="list-style-type: none"> Door to door distribution of backyard composters to 80% of single family households. Promotion of large 3-bin composting units distributed to apartment and co-operative housing complexes Promotion of vermicomposting to multi-family units Promotion of community composting
Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.). <ul style="list-style-type: none"> Special curbside collections of Christmas trees Curbside collection of white goods in all municipalities - frequency varies Drop-off depots for white goods (King Township) Mobile HHW depots HHW collection days (some municipalities) 	Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.). <ul style="list-style-type: none"> Special curbside collections of Christmas trees Curbside collection of white goods in all municipalities - frequency varies Drop-off depots for white goods (King Township) Mobile HHW depots HHW collection days (some municipalities) 	Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.). <ul style="list-style-type: none"> Special curbside collections of Christmas trees Curbside collection of white goods in all municipalities - frequency varies Drop-off depots for white goods (King Township) Mobile HHW depots HHW collection days (some municipalities) 	Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.). <ul style="list-style-type: none"> Special curbside collections of Christmas trees Curbside collection of white goods in all municipalities - frequency varies Drop-off depots for white goods (King Township) Mobile HHW depots HHW collection days (some municipalities) 	Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.). <ul style="list-style-type: none"> Special curbside collections of Christmas trees Curbside collection of white goods in all municipalities - frequency varies Drop-off depots for white goods (King Township) Mobile HHW depots HHW collection days (some municipalities) 	Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.). <ul style="list-style-type: none"> Special curbside collections of Christmas trees Curbside collection of white goods in all municipalities - frequency varies Drop-off depots for white goods (King Township) Mobile HHW depots HHW collection days (some municipalities)

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Table A.3

York Region

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Composting Facilities <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste (operated by Miller Waste Systems) 	Composting Facilities <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste 	Composting Facilities <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste 	Composting Facilities <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste 	Composting Facilities <ul style="list-style-type: none"> Existing centralized windrow leaf and yard waste composting facilities may be closed New central composting facility (in vessel) for composting of source separated household organics (wet stream) and leaf and yard waste 	Composting Facilities <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste New mixed waste processing and composting facility
Reuse Centres and Activities <ul style="list-style-type: none"> Goods exchange days in Richmond Hill 	Reuse Centres and Activities <ul style="list-style-type: none"> Goods exchange days in Richmond Hill 	Reuse Centres and Activities <ul style="list-style-type: none"> Goods exchange days in Richmond Hill 	Reuse Centres and Activities <ul style="list-style-type: none"> Goods exchange days in Richmond Hill 	Reuse Centres and Activities <ul style="list-style-type: none"> Goods exchange days in Richmond Hill 	Reuse Centres and Activities <ul style="list-style-type: none"> Goods exchange days in Richmond Hill
MRFs <ul style="list-style-type: none"> Markham MRF owned by Markham but operated by Miller Waste Systems. Currently operating on a temporary basis (will be replaced by new regional facility that is being built). Processes ONP, container materials and other recyclables - 15,300 tonnes in 1992 Richmond Hill MRF operated by Miller - 12,000 tonnes processed in 1992. It too will be replaced by planned regional facility New MRF will be required to meet 20 year needs Existing MRFs will close when new MRF constructed 	MRFs <ul style="list-style-type: none"> New MRF will be required to meet 20 year needs Existing/committed MRF in capital budget (\$2.2 million) in operation in 1993 Other MRFs will close when new MRF constructed 	MRFs <ul style="list-style-type: none"> One new Regional MRF for processing of dry recyclables MRF in existing/committed system would close when new MRF operational 	MRFs <ul style="list-style-type: none"> One new Regional MRF for processing of dry recyclables MRF in existing/committed system would close when new MRF operational 	MRFs <ul style="list-style-type: none"> One new Regional MRF for processing of dry recyclables MRF in existing/committed system would close when new MRF operational 	MRFs <ul style="list-style-type: none"> One new Regional MRF for processing of dry recyclables MRF in existing/committed system would close when new MRF operational

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Table A.3

York Region

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Promotion and Education <ul style="list-style-type: none"> Region only advertises HHW and leaf and yard waste programs. Other programs are left to the municipalities Municipalities conduct extensive promotion through advertising, brochures, hotline phone service and information flyers Richmond Hill and Markham conducted extensive door to door sales campaigns for composters with assistance from students. Markham also conducted a number of seminars for the general public and schools 	Residential Promotion and Education <ul style="list-style-type: none"> Region only advertises HHW and leaf and yard waste programs. Other programs are left to the municipalities Municipalities conduct extensive promotion through advertising, brochures, hotline phone service and information flyers Richmond Hill and Markham conducted extensive door to door sales campaigns for composters with assistance from students. Markham also conducted a number of seminars for the general public and schools 	Residential Promotion and Education <ul style="list-style-type: none"> Region only advertises HHW and leaf and yard waste programs. Other programs are left to the municipalities Municipalities conduct extensive promotion through advertising, brochures, hotline phone service and information flyers Richmond Hill and Markham conducted extensive door to door sales campaigns for composters with assistance from students. Markham also conducted a number of seminars for the general public and schools Promotion/education program on direct cost system Promotion/education program on source reduction, pre-cycling, reuse and recycling 	Residential Promotion and Education <ul style="list-style-type: none"> Region only advertises HHW and leaf and yard waste programs. Other programs are left to the municipalities Municipalities conduct extensive promotion through advertising, brochures, hotline phone service and information flyers Richmond Hill and Markham conducted extensive door to door sales campaigns for composters with assistance from students. Markham also conducted a number of seminars for the general public and schools Promotion/education program on Expanded Blue Box program Promotion/education program on source reduction, pre-cycling, reuse and recycling 	Residential Promotion and Education <ul style="list-style-type: none"> Region only advertises HHW and leaf and yard waste programs. Other programs are left to the municipalities Municipalities conduct extensive promotion through advertising, brochures, hotline phone service and information flyers Richmond Hill and Markham conducted extensive door to door sales campaigns for composters with assistance from students. Markham also conducted a number of seminars for the general public and schools Promotion/education program for wet/dry system Promotion/education program for source reduction, pre-cycling, reuse, recycling 	Residential Promotion and Education <ul style="list-style-type: none"> Region only advertises HHW and leaf and yard waste programs. Other programs are left to the municipalities Municipalities conduct extensive promotion through advertising, brochures, hotline phone service and information flyers Richmond Hill and Markham conducted extensive door to door sales campaigns for composters with assistance from students. Markham also conducted a number of seminars for the general public and schools Promotion/education program on source reduction, pre-cycling, reuse and recycling

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Table A.4

Peel Region

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities Collection of residential garbage from multi-family units by municipal forces or private contractors. Self haul of garbage to landfills and transfer stations by rural residents Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities Collection of residential garbage from multi-family units by municipal forces or private contractors. Self haul of garbage to landfills and transfer stations by rural residents. Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities Collection of residential garbage from multi-family units by municipal forces or private contractors. Self haul of garbage to landfills and transfer stations by rural residents Direct cost system for garbage collection. Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities Collection of residential garbage from multi-family units by municipal forces or private contractors. Self haul of garbage to landfills and transfer stations by rural residents. Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential waste from single family dwellings in three streams by specially designed trucks by municipal forces or contractors to municipalities. Collection of residential garbage from multi-family units in three streams, where feasible by municipal forces or private contractors. Self haul of garbage to landfills and transfer stations by rural residents. Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities Collection of residential garbage from multi-family units by municipal forces or private contractors. Self-haul of garbage to landfills and transfer stations by rural residents Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads
Residential Recycling and Collection <ul style="list-style-type: none"> Curbside collection of Blue Box materials from single family dwellings and some apartment buildings. Typical materials include at least ONP, PET, glass, ferrous, aluminum (Caledon), these and telephone directories in Brampton Expanded curbside collection (Mississauga) to collect additional materials (HDPE, mixed plastic, textiles, OMG, OCC) Collection of bins of recyclables from multi-family units 	Residential Recycling and Collection <ul style="list-style-type: none"> Curbside collection of Blue Box materials from single family dwellings and some apartment buildings includes all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations Expanded curbside collection (Mississauga) to collect additional materials (HDPE, mixed plastic, textiles, OMG, OCC) Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations) Collection of bins of recyclables from multi-family units 	Residential Recycling and Collection <ul style="list-style-type: none"> Curbside collection of Blue Box materials from single family dwellings and some apartment buildings includes all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations Expanded curbside collection (Mississauga) to collect additional materials (HDPE, mixed plastic, textiles, OMG, OCC) Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations) Collection of bins of recyclables from multi-family units 	Residential Recycling and Collection <ul style="list-style-type: none"> Curbside collection of Expanded Blue Box materials including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, cardboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles Recycling services for full range of Expanded Blue Box materials at all multi-family buildings with 6 or more units Collection of bins of recyclables (collecting all Expanded Blue Box materials) from multi-family units 	Residential Recycling and Collection <ul style="list-style-type: none"> Provide carts to all single family and some "other" households. Separation of waste into three streams (wet, dry and garbage) by the householder. Expanded set of dry materials to be collected, including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, cardboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations) Large bins provided in the garbage management area of multi-family buildings, where space available. Residents will be encouraged to separate their waste into three separate bags 	Residential Recycling and Collection <ul style="list-style-type: none"> Curbside collection of Blue Box materials from single family dwellings and some apartment buildings includes all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations Expanded curbside collection (Mississauga) to collect additional materials (HDPE, mixed plastic, textiles, OMG, OCC) Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations) Collection of bins of recyclables from multi-family units

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Table A.4

Peel Region

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depot for dry recyclables (including all banned materials) at Britannia landfill Depots located at transfer stations to provide recycling opportunities to self-haul generators Drop-off depots for multi-family residents not serviced by recycling Drop-off depots for rural households 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depot for dry recyclables (including all banned materials) at Britannia landfill Depots located at transfer stations to provide recycling opportunities to self-haul generators Drop-off depots for multi-family residents not serviced by recycling Drop-off depots for rural households 7 community recycling centres: 3 in Mississauga, 2 in Brampton, and 2 in Caledon, to accept recyclables, household hazardous waste, reusable items and residential waste. Construction of satellite drop-off facilities for recycling (Neighbourhood Recycling Depots and Mini Recycling Depots) 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depot for dry recyclables (including all banned materials) at Britannia landfill Depots located at transfer stations to provide recycling opportunities to self-haul generators Drop-off depots for multi-family residents not serviced by recycling Drop-off depots for rural households 7 community recycling centres: 3 in Mississauga, 2 in Brampton, and 2 in Caledon, to accept recyclables, household hazardous waste, reusable items and residential waste. Construction of satellite drop-off facilities for recycling (Neighbourhood Recycling Depots and Mini Recycling Depots) 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depot for dry recyclables (including all banned materials) at Britannia landfill Depots located at transfer stations to provide recycling opportunities to self-haul generators Drop-off depots for multi-family residents not serviced by recycling, for full range of Expanded Blue Box materials Drop-off depots for rural households (collecting all Expanded Blue Box materials) 7 community recycling centres: 3 in Mississauga, 2 in Brampton, and 2 in Caledon, to accept recyclables, household hazardous waste, reusable items and residential waste. Construction of satellite drop-off facilities for recycling (Neighbourhood Recycling Depots and Mini Recycling Depots) 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depot for dry recyclables (including all banned materials) at Britannia landfill Depots located at transfer stations to provide recycling opportunities to self-haul generators Drop-off depots for multi-family residents not serviced by recycling Drop-off depots for rural households 7 community recycling centres: 3 in Mississauga, 2 in Brampton, and 2 in Caledon, to accept recyclables, household hazardous waste, reusable items and residential waste. Construction of satellite drop-off facilities for recycling (Neighbourhood Recycling Depots and Mini Recycling Depots) 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> Drop-off depot for dry recyclables (including all banned materials) at Britannia landfill Depots located at transfer stations to provide recycling opportunities to self-haul generators 7 community recycling centres: 3 in Mississauga, 2 in Brampton, and 2 in Caledon, to accept recyclables, household hazardous waste, reusable items and residential waste. Construction of satellite drop-off facilities for recycling (Neighbourhood Recycling Depots and Mini Recycling Depots)
Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Limited seasonal curbside collection of leaf and yard waste 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste May be some drop-off depots for leaf and yard waste (3Rs Regulations) 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste May be some drop-off depots for leaf and yard waste (3Rs Regulations) 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste May be some drop-off depots for leaf and yard waste (3Rs Regulations) 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Collection of leaf and yard waste as part of three stream pick-up Separate brush collection May be some drop-off depots for leaf and yard waste (3Rs Regulations) 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste May be some drop-off depots for leaf and yard waste (3Rs Regulations)
Residential Household Composting <ul style="list-style-type: none"> Backyard composter distribution programs (56,839 units to end of 1992) Limited community composting Limited vermicomposting 	Residential Household Composting <ul style="list-style-type: none"> Backyard composter distribution programs (56,839 units to end of 1992) Backyard composters to be used in 68,839 single family households, an addition of 12,000 to existing system Additional community composting Additional vermicomposting 	Residential Household Composting <ul style="list-style-type: none"> Door to door distribution of backyard composters to 80% of single family households. Large 3-bin composting units distributed to apartment and co-operative housing complexes. Promotion of vermicomposting to multi-family units Promotion of community composting 	Residential Household Composting <ul style="list-style-type: none"> Door to door distribution of backyard composters to 80% of single family households. Large 3-bin composting units distributed to apartment and co-operative housing complexes. Promotion of vermicomposting to multi-family units Promotion of community composting 	Residential Household Composting <ul style="list-style-type: none"> Door to door distribution of backyard composters to 80% of single family households. Large 3-bin composting units distributed to apartment and co-operative housing complexes. Promotion of vermicomposting to multi-family units Promotion of community composting 	Residential Household Composting <ul style="list-style-type: none"> Door to door distribution of backyard composters to 80% of single family households. Large 3-bin composting units distributed to apartment and co-operative housing complexes. Promotion of vermicomposting to multi-family units Promotion of community composting

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Table A.4

Peel Region

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.)</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Special curbside collections of white goods Drop-off depots for white goods Once a year HHW collection at Bolton Community Centre Permanent drop-off depot for HHW at the Britannia Road landfill 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.)</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Special curbside collections of white goods Drop-off depots for white goods Once a year HHW collection at Bolton Community Centre Permanent drop-off depot for HHW at the Britannia Road landfill 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.)</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees following the Christmas season Special curbside collections of white goods Drop-off depots for white goods Once a year HHW collection at Bolton Community Centre Permanent drop-off depot for HHW at the Britannia Road landfill 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.)</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Special curbside collections of white goods Drop-off depots for white goods Once a year HHW collection at Bolton Community Centre Permanent drop-off depot for HHW at the Britannia Road landfill 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.)</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees following the Christmas season Special curbside collections of white goods Drop-off depots for white goods Once a year HHW collection at Bolton Community Centre Permanent drop-off depot for HHW at the Britannia Road landfill 	<p>Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.)</p> <ul style="list-style-type: none"> Special curbside collections of Christmas trees Special curbside collections of white goods Drop-off depots for white goods Once a year HHW collection at Bolton Community Centre Permanent drop-off depot for HHW at the Britannia Road landfill
<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste (at Brampton site, Britannia Road landfill and Caledon landfill) 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste (at Brampton site, Britannia Road landfill and Caledon landfill) 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste (at Brampton site, Britannia Road landfill and Caledon landfill) 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste (at Brampton site, Britannia Road landfill and Caledon landfill) 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Existing centralized windrow leaf and yard waste composting facilities may be closed Central composting facilities (in vessel) for composting of source separated household organics (wet stream) and leaf and yard waste 	<p>Composting Facilities</p> <ul style="list-style-type: none"> Centralized windrow composting of leaf and yard waste (at Brampton site, Britannia Road landfill and Caledon landfill) New mixed waste processing and composting facility
<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Municipal reuse centre (Caledon Landfill scavenging centre, Albion & Brampton goods exchanges) Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.) Food reuse organization (such as Second Harvest) 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Municipal reuse centre (Caledon Landfill scavenging centre, Albion & Brampton goods exchanges) Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.) Food reuse organization (such as Second Harvest) 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Municipal reuse centre (Caledon Landfill scavenging centre, Albion & Brampton goods exchanges) Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.) Food reuse organization (such as Second Harvest) 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Municipal reuse centre (Caledon Landfill scavenging centre, Albion & Brampton goods exchanges) Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.) Food reuse organization (such as Second Harvest) 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Municipal reuse centre (Caledon Landfill scavenging centre, Albion & Brampton goods exchanges) Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.) Food reuse organization (such as Second Harvest) 	<p>Reuse Centres and Activities</p> <ul style="list-style-type: none"> Municipal reuse centre (Caledon Landfill scavenging centre, Albion & Brampton goods exchanges) Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.) Food reuse organization (such as Second Harvest)

Schedule A — Cost Technical Appendix

Table A.4

Peel Region

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
MRFs <ul style="list-style-type: none"> • Mississauga processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/institutional) sector in Mississauga and Brampton. Owned and operated by Laidlaw under contract to the Region • MRF/Transfer Station in Bolton for Caledon material • One new Regional MRF for processing of dry recyclables (to meet 20 year requirement) 	MRFs <ul style="list-style-type: none"> • Laidlaw MRF will remain open but will not be part of the residential system • MRF/Transfer Station in Bolton for Caledon material • One new Regional MRF for processing of dry recyclables (to meet 20 year requirement) 	MRFs <ul style="list-style-type: none"> • Laidlaw MRF will remain open but will not be part of the residential system • MRF/Transfer Station in Bolton for Caledon material • One new Regional MRF for processing of dry recyclables (to meet 20 year requirement) 	MRFs <ul style="list-style-type: none"> • Laidlaw MRF will remain open but will not be part of the residential system • MRF/Transfer Station in Bolton for Caledon material • One new Regional MRF for processing of dry recyclables (to meet 20 year requirement) 	MRFs <ul style="list-style-type: none"> • Laidlaw MRF will remain open but will not be part of the residential system • MRF/Transfer Station in Bolton for Caledon material • One new Regional MRF for processing of dry recyclables (to meet 20 year requirement) 	MRFs <ul style="list-style-type: none"> • Laidlaw MRF will remain open but will not be part of the residential system • MRF/Transfer Station in Bolton for Caledon material • One new Regional MRF for processing of dry recyclables (to meet 20 year requirement)
Residential Promotion and Education <ul style="list-style-type: none"> • 3Rs promotion and education program, focused on the residential sector. • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc 	Residential Promotion and Education <ul style="list-style-type: none"> • 3Rs promotion and education program, focused on the residential sector. • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc 	Residential Promotion and Education <ul style="list-style-type: none"> • 3Rs promotion and education program, focused on the residential sector. • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc • Promotion/education on Direct cost program • Promotion/education program on source reduction, pre-cycling, composting reuse and recycling 	Residential Promotion and Education <ul style="list-style-type: none"> • 3Rs promotion and education program, focused on the residential sector. • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc • Promotion/education on Expanded Blue Box program. • Promotion/education program on source reduction, pre-cycling, composting reuse and recycling 	Residential Promotion and Education <ul style="list-style-type: none"> • 3Rs promotion and education program, focused on the residential sector. • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc • Promotion/education for wet/dry system • Promotion/education for source reduction/pre-cycling/composting/reuse/recycling 	Residential Promotion and Education <ul style="list-style-type: none"> • 3Rs promotion and education program, focused on the residential sector. • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc • Promotion/education for source reduction, pre-cycling, composting, reuse and recycling

Schedule A — Cost Technical Appendix

Table A.5

Halton Region

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Garbage Collection and Disposal <ul style="list-style-type: none"> • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 	Garbage Collection and Disposal <ul style="list-style-type: none"> • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Collection ban on grass clippings (Oakville) • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads 				
Residential Recycling and Collection <ul style="list-style-type: none"> • Recycling is mandatory in Halton. All households in the Region are served by curbside program, including rural homes and multi-family buildings. Region claims 100% participation, either through curbside pickup or depot service. • Materials include ONP, OCC, telephone directories, PET, HDPE, glass, steel, aluminum, aluminum foil, polystyrene foam, cardboard and fine paper. 	Residential Recycling and Collection <ul style="list-style-type: none"> • Recycling is mandatory in Halton. All households in the Region are served by curbside program, including rural homes and multi-family buildings. Region claims 100% participation, either through curbside pickup or depot service. • Materials include ONP, OCC, telephone directories, PET, HDPE, glass, steel, aluminum, aluminum foil, polystyrene foam, cardboard and fine paper. • Addition of 24 new igloos to Igloo Program in 1993 • Purchase of new recycling vehicles - \$255,000 allocated • Recycling services to all multi-family buildings with 6 or more units (3Rs regulations) 				
Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> • Drop-off depot for dry recyclables at new landfill 	Residential Recycling Depots and Transfer Stations <ul style="list-style-type: none"> • Drop-off depot for dry recyclables at new landfill • New HHW depot to be located at new Regional landfill site. 				

Schedule A — Cost Technical Appendix

Table A.5

Halton Region

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste Leaf and yard waste collected at Region's transfer stations delivered to Scott's Farms in Milton 	Residential Leaf and Yard Waste Collection <ul style="list-style-type: none"> Seasonal curbside collection of leaf and yard waste Leaf and yard waste collected at Region's transfer stations delivered to Scott's Farms in Milton Oakville has banned the collection of grass clippings Burlington has proposed a ban on the collection of grass clippings similar to Oakville's 				
Residential Household Composting <ul style="list-style-type: none"> Backyard composter distribution programs (25,700 units by end of '92). Limited community composting Limited vermicomposting 	Residential Household Composting <ul style="list-style-type: none"> Backyard composter distribution programs (25,700 units by end of '92). Distribution of 5,000 additional backyard composters - being handled by individual municipalities. Additional community composting Additional vermicomposting 				
Other Residential Waste Diversion (HHW, Toxic Tans, White Goods Collection, White Goods Drop-Off etc.). <ul style="list-style-type: none"> Special curbside collections of Christmas trees Both curbside and drop-off services for white goods. Two permanent HHW depots Milton collects pumpkins following Halloween and delivers them to a local pig farmer for animal feed 	Other Residential Waste Diversion (HHW, Toxic Tans, White Goods Collection, White Goods Drop-Off etc.). <ul style="list-style-type: none"> Special curbside collections of Christmas trees Both curbside and drop-off services for white goods. Two permanent HHW depots Milton collects pumpkins following Halloween and delivers them to a local pig farmer for animal feed. 				

Schedule A — Cost Technical Appendix

Table A.5

Halton Region

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Composting Facilities <ul style="list-style-type: none"> • Scott's Farms in Milton • 1.6 ha windrow facility in Oakville for leaf and yard waste • Other municipalities deliver leaf and yard waste to local farmers and landscaping companies 	Composting Facilities <ul style="list-style-type: none"> • Scott's Farms in Milton • 1.6 ha windrow facility in Oakville for leaf and yard waste • Other municipalities deliver leaf and yard waste to local farmers and landscaping companies • One new central composting facility (may be shared with Peel). 				
Reuse Centres and Activities <ul style="list-style-type: none"> • Wastewise in Halton Hills operates as community-based resource centre and diversion facility. Includes four different components: <ol style="list-style-type: none"> 1. education centre and information service 2. reuse centre accepting and selling household goods 3. repair centre repairing household appliances, power tools and equipment 4. recycling depot for materials not accepted by Blue Box, including: six grades of plastic, eight grades of paper, scrap metal, textiles, aggregate, egg cartons, rubber, film canisters, coat hangers etc. 	Reuse Centres and Activities <ul style="list-style-type: none"> • Wastewise in Halton Hills operates as community-based resource centre and diversion facility. Includes four different components: <ol style="list-style-type: none"> 1. education centre and information service. 2. reuse centre accepting and selling household goods 3. repair centre repairing household appliances, power tools and equipment. 4. recycling depot for materials not accepted by Blue Box, including: six grades of plastic, eight grades of paper, scrap metal, textiles, aggregate, egg cartons, rubber, film canisters, coat hangers etc. 				
MRFs <ul style="list-style-type: none"> • Regional MRF, owned by Region and operated by Halton Recycled Resources Inc. under contract to the Region, processes Region's recyclables 	MRFs <ul style="list-style-type: none"> • Region now using private MRF owned by Halton Recycled Resources and operated under contract to the Region. 				

Schedule A — Cost Technical Appendix

Table A.5

Halton Region

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Promotion and Education <ul style="list-style-type: none"> Extensive promotion of backyard composting conducted on a municipal level. Promotion efforts include advertising, open houses and seminar hosted by RCO. Halton Hills currently conducting survey to determine community's interest in backyard composting. 	Residential Promotion and Education <ul style="list-style-type: none"> Extensive promotion of backyard composting conducted on a municipal level. Promotion efforts include advertising, open houses and seminar hosted by RCO. Halton Hills currently conducting survey to determine community's interest in backyard composting. \$107,400 has been allocated in the 1993 budget for additional waste reduction education programs and display material design to increase participation rates. Wastewise producing a guide on how to start a community resource centre. 				

Schedule A — Cost Technical Appendix

Table A.6

GTA

IC&I System Components

System 1: Existing	System 2: Existing/Committed	System 3: Extended 3Rs Regulations	System 4: Expanded 3Rs Regulations	System 5: Expanded 3Rs Regulations with Organics	System 6: No Unprocessed Waste to Landfill
IC&I Collection – Dry Wastes <ul style="list-style-type: none"> Voluntary source separation of dry recyclables by some IC&I generators Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers. Curbside collection of IC&I recyclables in some areas by municipal forces. IC&I depots at transfer stations for use by small business generators Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) 	IC&I Collection – Dry Wastes <ul style="list-style-type: none"> Voluntary source separation of dry recyclables by some IC&I generators Mandatory source separation of designated materials by designated major generators (3Rs regulations) Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers Curbside collection of IC&I recyclables in some areas by municipal forces IC&I depots at transfer stations for use by small business generators Community Recycling Centres for use by small quantity IC&I generators Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) 	IC&I Collection – Dry Wastes <ul style="list-style-type: none"> <i>Mandatory source separation of designated materials by most IC&I generators in GTA (to capture generators of 90% of total IC&I waste - revision to 3Rs regulations)</i> Voluntary source separation of dry recyclables by small IC&I generators Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers Curbside collection of IC&I recyclables in some areas by municipal forces IC&I depots at transfer stations for use by small business generators Community Recycling Centres for use by small quantity IC&I generators Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) 	IC&I Collection – Dry Wastes <ul style="list-style-type: none"> Voluntary source separation of dry recyclables by some small IC&I generators <i>Mandatory source separation of expanded list of designated materials by most IC&I generators (to capture generators of 90% of total IC&I waste - revision to 3Rs regulations)</i> Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers Curbside collection of IC&I recyclables in some areas by municipal forces IC&I depots at transfer stations for use by small business generators Community Recycling Centres for use by small quantity IC&I generators Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) 	IC&I Collection – Dry Wastes <ul style="list-style-type: none"> Voluntary source separation of dry recyclables by small IC&I generators <i>Mandatory source separation of expanded list of designated materials by most generators (to capture generators of 90% of total IC&I waste - revision to 3Rs regulations)</i> Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers Curbside collection of IC&I recyclables in some areas by municipal forces IC&I depots at transfer stations for use by small business generators Community Recycling Centres for use by small quantity IC&I generators Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) 	IC&I Collection – Dry Wastes <ul style="list-style-type: none"> Voluntary source separation of dry recyclables by small IC&I generators Mandatory source separation of designated materials by designated major generators (3Rs regulations) Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers Curbside collection of IC&I recyclables in some areas by municipal forces IC&I depots at transfer stations for use by small business generators Community Recycling Centres for use by small quantity IC&I generators Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) <i>Mandatory processing of all dry wastes prior to landfilling (new policy required by Ontario, or condition on C of A for landfill)</i>
IC&I Collection – Wet Wastes <ul style="list-style-type: none"> Voluntary source separation of IC&I wet wastes Separate collection of IC&I wet wastes 	IC&I Collection – Wet Wastes <ul style="list-style-type: none"> Voluntary source separation of IC&I generated organics Separate collection of IC&I wet wastes 	IC&I Collection – Wet Wastes <ul style="list-style-type: none"> Voluntary source separation of IC&I generated organics Separate collection of IC&I wet wastes 	IC&I Collection – Wet Wastes <ul style="list-style-type: none"> Voluntary source separation of IC&I generated organics Separate collection of IC&I wet wastes 	IC&I Collection – Wet Wastes <ul style="list-style-type: none"> <i>Mandatory source separation of wet wastes by designated IC&I generators (revision to 3Rs regulations)</i> Voluntary source separation of IC&I generated organics Separate collection of IC&I wet wastes 	IC&I Collection – Wet Wastes <ul style="list-style-type: none"> Voluntary source separation of IC&I generated organics Separate collection of some IC&I wet wastes

Schedule A — Cost Technical Appendix

Table A.6

GTA

IC&I System Components

System 1: Existing	System 2: Existing/Committed	System 3: Extended 3Rs Regulations	System 4: Expanded 3Rs Regulations	System 5: Expanded 3Rs Regulations with Organics	System 6: No Unprocessed Waste to Landfill
IC&I Processing – Dry Wastes <ul style="list-style-type: none"> Processing of specific dry materials (e.g. C&D wastes, wood, drywall etc.) in specially designed facilities Processing centres for a wide range of dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff Processing of IC&I sector recyclables in municipal MRPs. Processing of IC&I sector recyclables by small private sector recyclers 	IC&I Processing – Dry Wastes <ul style="list-style-type: none"> Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities Processing centres for a wide range of dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff Processing of IC&I sector recyclables in municipal MRPs Processing of IC&I sector recyclables by small private sector recyclers 	IC&I Processing – Dry Wastes <ul style="list-style-type: none"> <i>Additional processing capacity for dry recyclables required</i> Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities Processing centres for a wide range of dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff Processing of IC&I sector recyclables in municipal MRPs Processing of IC&I sector recyclables by small private sector recyclers 	IC&I Processing – Dry Wastes <ul style="list-style-type: none"> <i>Additional processing capacity for wider list of dry materials required</i> Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities Processing centres for dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff Processing of IC&I sector recyclables in municipal MRPs Processing of IC&I sector recyclables by small private sector recyclers 	IC&I Processing – Dry Wastes <ul style="list-style-type: none"> <i>Additional processing capacity for dry recyclables</i> Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities Processing centres for dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff Processing of IC&I sector recyclables in municipal MRPs Processing of IC&I sector recyclables by small private sector recyclers 	IC&I Processing – Dry Wastes <ul style="list-style-type: none"> Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities. Processing centres for dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff Processing of IC&I sector recyclables in municipal MRPs Processing of IC&I sector recyclables by small private sector recyclers <i>Mandatory processing of all dry wastes prior to landfilling (new policy)</i> <i>Mandatory processing of all mixed wastes prior to landfilling (new policy)</i> <i>Additional facilities for processing dry recyclables</i> <i>Additional facilities for processing mixed wastes</i>
IC&I Processing – Wet Wastes <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector 	IC&I Processing – Wet Wastes <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector 	IC&I Processing – Wet Wastes <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector 	IC&I Processing – Wet Wastes <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector 	IC&I Processing – Wet Wastes <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Centralized composting of IC&I organics in in-vessel system Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector <i>New composting facility (in-vessel) for IC&I organics</i> 	IC&I Processing – Wet Wastes <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector <i>New composting facility (in-vessel) for IC&I organics</i>

Schedule A — Cost Technical Appendix

Table A.6

GTA

IC&I System Components

System 1: Existing	System 2: Existing/Committed	System 3: Extended 3Rs Regulations	System 4: Expanded 3Rs Regulations	System 5: Expanded 3Rs Regulations with Organics	System 6: No Unprocessed Waste to Landfill
IC&I Reuse <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, provincial and local waste exchange programs Community-based reuse programs for small IC&I generators Use of food wastes as animal feed Use of food waste for human consumption Landspreading of IC&I organics Refilling of IC&I containers and packaging (e.g. refillable bottles, refillable pails or drums, etc.) Use of re-usable packaging (e.g. reusable plastic and wood pallets) 	IC&I Reuse <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, provincial and local waste exchange programs Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators Use of food wastes as animal feed Use of food waste for human consumption Landspreading of IC&I organics Use of refillable containers (refillable bottles, refillable pails or drums, etc.) Use of re-usable packaging (e.g. reusable plastic and wood pallets) 	IC&I Reuse <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators Use of food wastes as animal feed Use of food waste for human consumption Landspreading of IC&I organics Use of refillable containers (refillable bottles, refillable pails or drums) Use of re-usable packaging (e.g. reusable plastic and wood pallets) 	IC&I Reuse <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators Use of food wastes as animal feed Use of food waste for human consumption Landspreading of IC&I organics Use of refillable containers (refillable bottles, refillable pails or drums) Use of re-usable packaging (e.g. reusable plastic and wood pallets) 	IC&I Reuse <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators Increased use of food wastes as animal feed Increased use of food waste for human consumption Increased landspreading of IC&I organics Use of refillable containers such as packaging by businesses (refillable bottles, refillable pails or drums, etc.) Use of re-usable packaging (e.g. reusable plastic and wood pallets) 	IC&I Reuse <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators Use of food wastes as animal feed Use of food waste for human consumption Landspreading of IC&I organics Use of refillable containers (refillable bottles, refillable pails or drums, etc.) Use of re-usable packaging (e.g. reusable plastic and wood pallets, etc.)
IC&I Reduction <ul style="list-style-type: none"> Voluntary waste reduction actions by IC&I generators Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse 	IC&I Reduction <ul style="list-style-type: none"> Voluntary waste reduction actions by IC&I generators Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse Mandatory development of waste reduction action plans by designated major IC&I generators (defined in 3Rs regulations) Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations) 	IC&I Reduction <ul style="list-style-type: none"> Voluntary waste reduction actions by IC&I generators Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse Mandatory development of waste reduction action plans by most IC&I generators (revision to 3Rs regulations) Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations) 	IC&I Reduction <ul style="list-style-type: none"> Voluntary waste reduction actions by small IC&I generators Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse Mandatory development of waste reduction action plans by most IC&I generators (revision to 3Rs regulations) Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations) 	IC&I Reduction <ul style="list-style-type: none"> Voluntary waste reduction actions by small IC&I generators Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse Mandatory development of waste reduction action plans by most IC&I generators (revision to 3Rs regulations) Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations) 	IC&I Reduction <ul style="list-style-type: none"> voluntary waste reduction actions by small IC&I generators. Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse Mandatory development of waste reduction action plans by designated major IC&I generators (defined in 3Rs regulations). Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations).

Schedule A — Cost Technical Appendix

Table A.6

GTA

IC&I System Components

System 1: Existing	System 2: Existing/Committed	System 3: Extended 3Rs Regulations	System 4: Expanded 3Rs Regulations	System 5: Expanded 3Rs Regulations with Organics	System 6: No Unprocessed Waste to Landfill
IC&I Programs <ul style="list-style-type: none"> Voluntary waste audits performed by IC&I generators Independent voluntary waste reduction programs in private companies Voluntary packaging reporting by packaging users (NAPP) 	IC&I Programs <ul style="list-style-type: none"> Voluntary waste audits performed by IC&I generators Independent voluntary waste reduction programs in private companies Mandatory waste audits by designated major IC&I generators (3Rs regulations) Mandatory packaging audits by designated major packaging generators (3Rs regulations) Voluntary packaging reporting by packaging users (NAPP) 	IC&I Programs <ul style="list-style-type: none"> Voluntary waste audits performed by small IC&I generators Independent voluntary waste reduction programs in private companies Mandatory waste audits by most IC&I generators (revision to 3Rs regulations) Mandatory packaging audits by designated major packaging generators (3Rs regulations) Voluntary packaging reporting by packaging users (NAPP) 	IC&I Programs <ul style="list-style-type: none"> Voluntary waste audits performed by small IC&I generators Independent voluntary waste reduction programs in private companies Mandatory waste audits by most IC&I generators (revision to 3Rs regulations) Mandatory packaging audits by designated major packaging generators (3Rs regulations) Voluntary packaging reporting by packaging users (NAPP) 	IC&I Programs <ul style="list-style-type: none"> Voluntary waste audits performed by small IC&I generators Independent voluntary waste reduction programs in small private companies Mandatory waste audits by most IC&I generators (revision to 3Rs regulations) Mandatory packaging audits by designated major packaging generators (3Rs regulations) Voluntary packaging reporting by packaging users (NAPP) 	IC&I Programs <ul style="list-style-type: none"> Voluntary waste audits performed by small IC&I generators Independent voluntary waste reduction programs in small private companies Mandatory waste audits by designated major IC&I generators (defined in 3Rs regulations) Mandatory packaging audits by designated major packaging generators (3Rs regulations) Voluntary packaging reporting by packaging users (NAPP)
IC&I Promotion & Education <ul style="list-style-type: none"> Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality Promotion/education of IC&I waste reduction by non-profit organizations Promotion/education of IC&I waste reduction by associations 	IC&I Promotion & Education <ul style="list-style-type: none"> Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality Promotion/education of IC&I waste reduction by non-profit organizations Promotion/education of IC&I waste reduction by associations Mandatory posting of waste reduction plans for review by employees of designated major IC&I generators (3Rs regulations) 	IC&I Promotion & Education <ul style="list-style-type: none"> Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality Promotion/education of IC&I waste reduction by non-profit organizations Promotion/education of IC&I waste reduction by associations Mandatory posting of waste reduction plans for review by employees of most IC&I generators (revision to 3Rs regulations) 	IC&I Promotion & Education <ul style="list-style-type: none"> Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality Promotion/education of IC&I waste reduction by non-profit organizations Promotion/education of IC&I waste reduction by associations Mandatory posting of waste reduction plans for review by employees of most IC&I generators (revision to 3Rs regulations) 	IC&I Promotion & Education <ul style="list-style-type: none"> Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality Promotion/education of IC&I waste reduction by non-profit organizations Promotion/education of IC&I waste reduction by associations Mandatory posting of waste reduction plans for review by employees of most IC&I generators (revision to 3Rs regulations) 	IC&I Promotion & Education <ul style="list-style-type: none"> Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality Promotion/education of IC&I waste reduction by non-profit organizations Promotion/education of IC&I waste reduction by associations Mandatory posting of waste reduction plans for review by employees of designated major IC&I generators (3Rs regulations)

SCHEDULE B

RESIDENTIAL NET EFFECTS TABLES

TABLE PR. 1
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: Peel

SYSTEM: Existing

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	<p>\$33/hh/yr (diversion system)</p> <p>\$126-\$178/hh/yr (total system)</p>	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	<p>\$33/hh/yr (diversion system)</p> <p>\$126-\$178/hh/yr</p>	<ul style="list-style-type: none"> • least expensive based on diversion system • least-expensive based on total system

**TABLE PR. 2
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: Peel
SYSTEM: Existing/Committed

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	\$42/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$42/hh/yr (diversion system)	<ul style="list-style-type: none"> • least expensive based on diversion system
	\$129-\$177/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$129-\$177/hh/yr (total system)	<ul style="list-style-type: none"> • least expensive based on total system

TABLE PR. 3
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: Peel

SYSTEM: Direct Cost

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	<p>\$60/hh/yr (diversion system)</p> <p>\$133-\$174/hh/yr (total system)</p>	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	<p>\$60/hh/yr (diversion system)</p> <p>\$133-\$174/hh/yr (total system)</p>	<ul style="list-style-type: none"> • moderately expensive based on diversion system • least expensive based on total system

TABLE PR. 4
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: Peel

SYSTEM: Expanded Blue Box

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	\$64/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$64/hh/yr (diversion system)	<ul style="list-style-type: none"> • moderately expensive based on diversion system
	\$136-\$175/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$136-\$175/hh/yr (total system)	<ul style="list-style-type: none"> • least expensive based on total system

**TABLE PR. 5
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: Peel
SYSTEM: Wet/Dry

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Household				
Indicator - \$/hh/yr	\$77/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$77/hh/yr (diversion system)	<ul style="list-style-type: none"> • expensive based on diversion system
	\$157-\$188/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$157-\$188/hh/yr (total system)	<ul style="list-style-type: none"> • expensive based on total system

**TABLE PR. 6A
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: Peel

SYSTEM: Mixed Waste Processing (Low Quality Compost)

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Household				
Indicator - \$/hh/yr	\$154/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$154/hh/yr (diversion system)	<ul style="list-style-type: none"> • second most expensive based on diversion system
	\$206-\$235/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$206-\$235/hh/yr (total system)	<ul style="list-style-type: none"> • most expensive based on total system

**TABLE PR. 6B
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: Peel

SYSTEM: Mixed Waste Processing (High Quality Compost)

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Household				
Indicator - \$/hh/yr	\$173/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$173/hh/yr (diversion system)	<ul style="list-style-type: none"> • most expensive based on diversion system
	\$203-\$219/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$203-\$219/hh/yr (total system)	<ul style="list-style-type: none"> • most expensive based on total system

**TABLE DR. 1
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: Durham
SYSTEM: Existing

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Household				
Indicator - \$/hh/yr	<p>\$49/hh/yr (diversion system)</p> <p>\$117 - \$153/hh/yr (total system)</p>	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	<p>\$49/hh/yr (diversion system)</p> <p>\$117 - \$153/hh/yr</p>	<ul style="list-style-type: none"> • least expensive based on diversion system • least expensive based on total system

**TABLE DR. 2
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: Durham
SYSTEM: Existing/Committed

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Household				
Indicator - \$/hh/yr	<p>\$55/hh/yr (diversion system)</p> <p>\$119 - \$153/hh/yr (total system)</p>	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	<p>\$55/hh/yr (diversion system)</p> <p>\$119 - \$153/hh/yr (total system)</p>	<ul style="list-style-type: none"> • least expensive based on diversion system • least expensive based on total system

**TABLE DR. 3
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: Durham

SYSTEM: Direct Cost

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Household				
Indicator - \$/hh/yr	\$70/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$70/hh/yr (diversion system)	<ul style="list-style-type: none"> • moderately expensive based on diversion system
	\$122 - \$150/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$122 - \$150/hh/yr (total system)	<ul style="list-style-type: none"> • least expensive based on total system

**TABLE DR. 4
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: Durham
SYSTEM: Expanded Blue Box

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Household				
Indicator - \$/hh/yr	\$75/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$75/hh/yr (diversion system)	<ul style="list-style-type: none"> • moderately expensive based on diversion system
	\$126 - 154/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$126 - \$154/hh/yr (total system)	<ul style="list-style-type: none"> • least expensive based on total system

**TABLE DR. 5
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: Durham

SYSTEM: Wet/Dry

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	\$87/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$87/hh/yr (diversion system)	<ul style="list-style-type: none"> • expensive based on diversion system
	\$142 - \$163/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$142 - \$163/hh/yr (total system)	<ul style="list-style-type: none"> • expensive based on total system

**TABLE DR. 6A
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: Durham

SYSTEM: Mixed Waste Processing (Low Quality Compost)

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	\$139/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$139/hh/yr (diversion system)	<ul style="list-style-type: none"> • most expensive based on diversion system
	\$176-196/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$176-196/hh/yr (total system)	<ul style="list-style-type: none"> • most expensive based on total system

**TABLE DR. 6B
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: Durham

SYSTEM: Mixed Waste Processing (High Quality Compost)

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Household				
Indicator - \$/hh/yr	\$152/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$152/hh/yr (diversion system)	<ul style="list-style-type: none"> • most expensive based on diversion system
	\$173-184/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$173-184/hh/yr (total system)	<ul style="list-style-type: none"> • most expensive based on total system

TABLE MR. 1
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: Metro Toronto

SYSTEM: Existing

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	<p>\$34/hh/yr (diversion system)</p> <p>\$139-\$187/hh/yr (total system)</p>	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	<p>\$34/hh/yr (diversion system)</p> <p>\$139-\$187/hh/yr</p>	<ul style="list-style-type: none"> • least expensive based on diversion system • least expensive based on total system

**TABLE MR. 2
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: MetroToronto
SYSTEM: Existing/Committed

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	\$38/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$38/hh/yr (diversion system)	<ul style="list-style-type: none"> • least expensive based on diversion system
	\$140-\$186/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$140-\$186/hh/yr (total system)	<ul style="list-style-type: none"> • least expensive based on total system

TABLE MR. 3
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: MetroToronto

SYSTEM: Direct Cost

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	\$50/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$50/hh/yr (diversion system)	<ul style="list-style-type: none"> • expensive based on diversion system
	\$141-\$182/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$141-\$182/hh/yr (total system)	<ul style="list-style-type: none"> • least expensive based on total system

**TABLE MR. 4
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: MetroToronto
SYSTEM: Expanded Blue Box

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Household				
Indicator - \$/hh/yr	\$59/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$59/hh/yr (diversion system)	<ul style="list-style-type: none"> • expensive based on diversion system
	\$145-\$185/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$145-\$185/hh/yr (total system)	<ul style="list-style-type: none"> • least expensive based on total system

**TABLE MR. 5
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: MetroToronto
SYSTEM: Wet/Dry

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Household				
Indicator - \$/hh/yr	\$57/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$57/hh/yr (diversion system)	<ul style="list-style-type: none"> • expensive based on diversion system
	\$141-\$174/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$141-\$174/hh/yr (total system)	<ul style="list-style-type: none"> • least expensive based on total system

**TABLE MR. 6A
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: MetroToronto

SYSTEM: Mixed Waste Processing (Low Quality Compost)

Criteria/Indicator	Effects by Indicator	Mitigation/Enhancement	System Net Effects by Criterion	Advantages/Disadvantages by Criterion
Criterion - Cost per Household				
Indicator - \$/hh/yr	\$143/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$143/hh/yr (diversion system)	<ul style="list-style-type: none"> • most expensive based on diversion system
	\$204-\$232/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$204-\$232/hh/yr (total system)	<ul style="list-style-type: none"> • most expensive based on total system

**TABLE MR. 6B
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: MetroToronto
SYSTEM: Mixed Waste Processing (High Quality Compost)

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	\$160/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$160/hh/yr (diversion system)	<ul style="list-style-type: none"> • most expensive based on diversion system
	\$196-\$213/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$196-\$213/hh/yr (total system)	<ul style="list-style-type: none"> • most expensive based on total system

**TABLE YR. 1
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: York
SYSTEM: Existing

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	<p>\$39/hh/yr (diversion system)</p> <p>\$130-173/hh/yr (total system)</p>	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	<p>\$39/hh/yr (diversion system)</p> <p>\$130-173/hh/yr</p>	<ul style="list-style-type: none"> • least expensive based on diversion system • least expensive based on total system

**TABLE YR. 2
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: York
SYSTEM: Existing/Committed

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	\$41/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$41/hh/yr (diversion system)	<ul style="list-style-type: none"> • least expensive based on diversion system
	\$130-\$173/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$130-\$173/hh/yr (total system)	<ul style="list-style-type: none"> • least expensive based on total system

**TABLE YR. 3
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: York
SYSTEM: Direct Cost

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	<p>\$55/hh/yr (diversion system)</p> <p>\$126-\$160/hh/yr (total system)</p>	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	<p>\$55/hh/yr (diversion system)</p> <p>\$126-\$160/hh/yr (total system)</p>	<ul style="list-style-type: none"> • moderately expensive based on diversion system • least expensive based on total system

**TABLE YR. 4
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: York
SYSTEM: Expanded Blue Box

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Household				
Indicator - \$/hh/yr	<p>\$57/hh/yr (diversion system)</p> <p>\$127-\$161/hh/yr (total system)</p>	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	<p>\$57/hh/yr (diversion system)</p> <p>\$127-\$161/hh/yr (total system)</p>	<ul style="list-style-type: none"> • moderately expensive based on diversion system • least expensive based on total system

**TABLE YR. 5
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: York
SYSTEM: Wet/Dry

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Household				
Indicator - \$/hh/yr	<p>\$84/hh/yr (diversion system)</p> <p>\$149-\$175/hh/yr (total system)</p>	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	<p>\$84/hh/yr (diversion system)</p> <p>\$149-\$175/hh/yr (total system)</p>	<ul style="list-style-type: none"> • expensive based on diversion system • expensive based on total system

**TABLE YR. 6A
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: York
SYSTEM: Mixed Waste Processing (Low Quality Compost)

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	\$143/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$143/hh/yr (diversion system)	<ul style="list-style-type: none"> • second most expensive based on diversion system
	\$194-\$218/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$194-\$218/hh/yr (total system)	<ul style="list-style-type: none"> • most expensive based on total system

**TABLE YR. 6B
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: York
SYSTEM: Mixed Waste Processing (High Quality Compost)

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Household				
Indicator – \$/hh/yr	\$160/hh/yr (diversion system)	<ul style="list-style-type: none"> • improve system efficiency • decrease disposal tonnages • increase recycling tonnages 	\$160/hh/yr (diversion system)	<ul style="list-style-type: none"> • most expensive based on diversion system
	\$188-\$202/hh/yr (total system)	<ul style="list-style-type: none"> • increase use of backyard composters • increase source separation of yard waste • increase promotion and education 	\$188-\$202/hh/yr (total system)	<ul style="list-style-type: none"> • most expensive based on total system

SCHEDULE C
IC&I NET EFFECTS TABLES

Schedule C
TABLE 1
IC&I SYSTEM NET EFFECTS BY COMPONENT

SYSTEM: IC&I Existing
 CRITERIA GROUP: Cost
 CRITERIA: Cost per Tonne Diverted
 INDICATOR: \$ per Tonne Diverted

Component Category/ Components	Component Environmental Effects	Mitigation/ Enhancement	Component Net Effects
IC&I Collection - Dry Wastes <ul style="list-style-type: none"> Voluntary source separation of dry recyclables by some IC&I generators Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers. Curbside collection of IC&I recyclables in some areas by municipal forces. IC&I depots at transfer stations for use by small business generators Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.). 	<ul style="list-style-type: none"> average of \$50/tonne for collection of IC&I dry wastes some materials have a high market value such that collection costs are covered by hauler/recycler in some circumstances 	<ul style="list-style-type: none"> larger generators can realize cost economies with roll-off bins or front-end loader service source separating materials reduces the cost of collection and processing services although space, staff and storage bins are required 	<ul style="list-style-type: none"> average of \$50/tonne for collection of IC&I dry wastes
IC&I Collection - Wet Wastes <ul style="list-style-type: none"> Voluntary source separation of IC&I wet wastes Separate collection of IC&I wet wastes 	<ul style="list-style-type: none"> an average of \$50/tonne for collection in some cases a higher rate may be charged for food wastes due to high density higher costs may be incurred as food wastes may require more frequent collection 	<ul style="list-style-type: none"> higher volumes allow economies of scale to be realized by specific establishments (different storage/collection methods) higher volumes collected in general may lower costs to all generators 	<ul style="list-style-type: none"> an average of \$50/tonne for collection

<p>IC&I Processing – Dry Wastes</p> <ul style="list-style-type: none"> • Processing of specific dry materials (e.g. C&D wastes, wood, drywall etc.) in specially designed facilities • Processing centres for a wide range of dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs. • Processing of IC&I sector recyclables by small private sector recyclers 	<ul style="list-style-type: none"> • processing costs depend on waste material, volumes and handling program • tipping/handling fees charged to generators vary from approximately \$40/tonne for OCC to \$115/tonne for mixed wastes. • some plastics likely have a significantly higher cost for processing due to market value and technical limitations. A representative cost of approximately \$280/tonne has been assumed for this analysis. Some sources have suggested much higher costs. • In municipally-run MRFs, cost typically are in the range of \$40 to \$80 per tonne 	<ul style="list-style-type: none"> • market development may have a positive effect on costs of processing charged to IC&I waste generators • processing larger volumes of wastes may allow economies of scale to be passed on to IC&I waste generators 	<p>tipping/handling fees charged to generators vary from approximately \$40/tonne for OCC to \$115/tonne for mixed wastes.</p>
<p>IC&I Processing – Wet Wastes</p> <ul style="list-style-type: none"> • Centralized windrow composting of source-separated IC&I organics • On-site composting of source separated organics generated by the IC&I sector • Vermicomposting at some IC&I locations • Rendering of food wastes from IC&I sector 	<ul style="list-style-type: none"> • \$30/tonne price for windrow composting based on charges at Scotts Farm and other municipally-run composting facilities 	<ul style="list-style-type: none"> • windrow composting is a cost-effective method; • in-vessel options may have higher costs though economies of scale may be realized and reflected in the price charged to IC&I generators • operational improvements may lower costs • market development for finished compost and larger volumes may lower costs • good source separation will improve compost quality 	<ul style="list-style-type: none"> • \$30/tonne price for windrow composting

<p>IC&I Reuse</p> <ul style="list-style-type: none"> • Reuse by IC&I generators, through the Canadian, provincial and local waste exchange programs • Community-based reuse programs for small IC&I generators • Use of food wastes as animal feed • Use of food waste for human consumption • Landspreading of IC&I organics • Refilling of IC&I containers and packaging (e.g. refillable bottles, refillable pails or drums, etc) • Use of re-usable packaging (e.g. reusable plastic and wood pallets) 	<ul style="list-style-type: none"> • informal reuse occurs at low cost • reuse centres may operate at approximately \$50/tonne (to be confirmed) • food wastes may be collected at zero cost to the IC&I generator for use as animal feed (confirm) 	<ul style="list-style-type: none"> • higher volumes likely would have a positive effect of lowering prices charged to IC&I generators 	<ul style="list-style-type: none"> • reuse costs are expected to be relatively low
<p>IC&I Reduction</p> <ul style="list-style-type: none"> • Voluntary waste reduction actions by IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse 	<ul style="list-style-type: none"> • difficult to assign a cost to waste reduction initiatives as they can be very diverse and little information is available. • costs may include investment in research (audits and technology development), substitution of more costly materials, shorter shelf-life of non-durable consumer goods which may require more costly operational regimes (retail/wholesale sectors), and others 	<ul style="list-style-type: none"> • Develop systems for monitoring source reduction costs 	<ul style="list-style-type: none"> • limited available data
<p>IC&I Programs</p> <ul style="list-style-type: none"> • Voluntary waste audits performed by IC&I generators • Independent voluntary waste reduction programs in private companies • Voluntary packaging reporting by packaging users (NAPP) 	<ul style="list-style-type: none"> • waste audits and workplans are site and establishment-specific even for larger corporations. • audits may cost between \$2500 and \$50,000/facility, depending on the size and diversity of activities • For smaller establishments the absolute costs may be less • packaging audits are generally more costly as information on external factors such as recycled content of purchased materials is required. 	<ul style="list-style-type: none"> • provision of support and advisory services may provide cost efficiencies for individual establishments 	<ul style="list-style-type: none"> • costs are expected to be relatively low

<p>IC&I Promotion & Education</p> <ul style="list-style-type: none"> • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations 	<ul style="list-style-type: none"> • costs are relatively low, typically a few dollars per employee per year • for in-house activities, existing infrastructure may be used, such as newsletters and bulletins for promotion of waste reduction initiatives 	<ul style="list-style-type: none"> • valuable enhancement to improve performance of systems 	<ul style="list-style-type: none"> • considered to be relatively low cost
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Schedule C
TABLE 1
IC&I SYSTEM NET EFFECTS BY COMPONENT

SYSTEM: IC&I Existing
 CRITERIA GROUP: Cost
 CRITERIA: Total System Cost
 INDICATOR: Total System \$

Component Category/ Components	Component Environmental Effects	Mitigation/ Enhancement	Component Net Effects
IC&I Collection - Dry Wastes <ul style="list-style-type: none"> Voluntary source separation of dry recyclables by some IC&I generators Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers. Curbside collection of IC&I recyclables in some areas by municipal forces. IC&I depots at transfer stations for use by small business generators Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.). 	<ul style="list-style-type: none"> an estimated total collection cost of \$148 million dry recyclables total collection cost based on unit cost of approximately \$50/tonne multiplied by the quantities of dry materials recovered some materials have a high market value such that collection costs are covered by hauler/recycler in some circumstances cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes) 	<ul style="list-style-type: none"> larger generators can realize cost economies with roll-off bins or front-end loader service source separating materials reduces the cost of collection and processing services although space, staff and storage bins are required 	<ul style="list-style-type: none"> an estimated total collection cost of \$148 million total collection cost for dry recyclables based on unit cost of approximately \$50/tonne multiplied by the quantities of dry materials recovered cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes)

<p>IC&I Collection – Wet Wastes</p> <ul style="list-style-type: none"> • Voluntary source separation of IC&I wet wastes • Separate collection of IC&I wet wastes 	<ul style="list-style-type: none"> • an estimated total collection cost of \$14 million • wet organics collection cost based on unit cost of approximately \$50/tonne multiplied by the quantity of wet organics collected • in some cases a higher rate may be charged for food wastes due to high density • higher costs may be incurred as food wastes may require more frequent collection • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes) 	<p>higher volumes allow economies of scale to be realized by specific establishments (different storage/collection methods)</p> <ul style="list-style-type: none"> • higher volumes collected in general may lower costs to all generators 	<ul style="list-style-type: none"> • an estimated total collection cost of \$14 million • wet organics collection cost based on unit cost of approximately \$50/tonne multiplied by the quantity of wet organics collected • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes)
<p>IC&I Processing – Dry Wastes</p> <ul style="list-style-type: none"> • Processing of specific dry materials (e.g. C&D wastes, wood, drywall etc.) in specially designed facilities • Processing centres for a wide range of dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs. • Processing of IC&I sector recyclables by small private sector recyclers 	<ul style="list-style-type: none"> • an estimated total processing/handling cost of \$57 million for dry recyclables • an estimated total disposal cost for dry garbage/residues of \$102 million (@\$50/tonne disposal fee) and \$204 million (@ \$100/tonne disposal fee) • tipping/handling fees and processing costs charged to generators depend on waste material, volumes and handling program • total cost of processing dry recyclables based on unit costs for processing different materials (varying from \$40/tonne for OCC to \$115/tonne for mixed wastes) multiplied by the quantities of each material processed. • cost of disposing residues assumed to be included in tipping fee (one reason why unit cost for mixed waste relatively high) 	<ul style="list-style-type: none"> • market development may have a positive effect on costs of processing charged to IC&I waste generators • processing larger volumes of wastes may allow economies of scale to be passed on to IC&I waste generators 	<ul style="list-style-type: none"> • an estimated total processing/handling cost of \$57 million for dry recyclables • an estimated total disposal cost for dry garbage/residues of \$102 million (@\$50/tonne disposal fee) and \$204 million (@ \$100/tonne disposal fee) • total cost of processing dry recyclables based on unit costs for processing different materials (varying from \$40/tonne for OCC to \$115/tonne for mixed wastes) multiplied by the quantities of each material processed. • cost of disposing residues assumed to be included in tipping fee

<p>IC&I Processing – Wet Wastes</p> <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector 	<ul style="list-style-type: none"> an estimated total processing/handling cost of \$101,000 for wet waste an estimated total disposal cost for wet garbage/residues of \$14 million (@\$50/tonne disposal fee) and \$28 million (@ \$100/tonne disposal fee) cost of processing wet wastes based on the unit cost of processing at a centralized facility such as Scotts Farm (approximately \$30/tonne) multiplied by the quantity of wet organics processed this may be high as other markets involving different processing methods may have lower associated costs to the generator cost of disposing rejected residues or of unmarketable product, if any, assumed to be included in the price of \$30/tonne 	<ul style="list-style-type: none"> windrow composting is a cost-effective method; in-vessel options may have higher costs though economies of scale may be realized and reflected in the price charged to IC&I generators operational improvements may lower costs strong market revenues for finished compost would lower cost good source separation will improve compost quality 	<ul style="list-style-type: none"> an estimated total processing/handling cost of \$101,000 for wet waste an estimated total disposal cost for wet garbage/residues of \$14 million (@\$50/tonne disposal fee) and \$28 million (@ \$100/tonne disposal fee) cost of processing wet wastes based on the unit cost of processing at a centralized facility such as Scotts Farm (approximately \$30/tonne) multiplied by the quantity of wet organics processed cost of disposing rejected residues or of unmarketable product, if any, assumed to be included in the price of \$30/tonne
<p>IC&I Reuse</p> <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, provincial and local waste exchange programs Community-based reuse programs for small IC&I generators Use of food wastes as animal feed Use of food waste for human consumption Landspreading of IC&I organics Refilling of IC&I containers and packaging (e.g. refillable bottles, refillable pails or drums, etc) Use of re-usable packaging (e.g. reusable plastic and wood pallets) 	<ul style="list-style-type: none"> costs estimated to be relatively low 	<ul style="list-style-type: none"> higher volumes likely would have a positive effect of lowering prices charged to IC&I generators 	<ul style="list-style-type: none"> costs expected to be low

IC&I Reduction <ul style="list-style-type: none"> • Voluntary waste reduction actions by IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse 	<ul style="list-style-type: none"> • difficult to assign a cost to waste reduction initiatives as they can be very diverse and little information is available. • costs may include investment in research (audits and technology development), substitution of more costly materials, shorter shelf-life of non-durable consumer goods which may require more costly operational regimes (retail/wholesale sectors), and others 	<ul style="list-style-type: none"> • Develop systems to monitor source reduction costs 	<ul style="list-style-type: none"> • limited cost data available
IC&I Programs <ul style="list-style-type: none"> • Voluntary waste audits performed by IC&I generators • Independent voluntary waste reduction programs in private companies • Voluntary packaging reporting by packaging users (NAPP) 	<ul style="list-style-type: none"> • waste audits and workplans are site and establishment-specific even for larger corporations. • audits may cost between \$2,500 and \$50,000/facility, depending on the size and diversity of activities • For smaller establishments the absolute costs may be less • packaging audits are generally more costly as information on external factors such as recycled content of purchased materials is required. 	<ul style="list-style-type: none"> • provision of support and advisory services may provide cost efficiencies for individual establishments 	<ul style="list-style-type: none"> • costs are expected to be relatively low
IC&I Promotion & Education <ul style="list-style-type: none"> • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations 	<ul style="list-style-type: none"> • costs are relatively low, typically a few dollars per employee per year • for in-house activities, existing infrastructure may be used, such as newsletters and bulletins for promotion of waste reduction initiatives 	<ul style="list-style-type: none"> • valuable enhancement to improve performance of systems 	<ul style="list-style-type: none"> • considered to be relatively low cost

Schedule C
TABLE 1
IC&I SYSTEM NET EFFECTS BY COMPONENT

SYSTEM:	<u>IC&I Existing/Committed</u>
CRITERIA GROUP:	<u>Cost</u>
CRITERIA:	<u>Cost per Tonne Diverted</u>
INDICATOR:	<u>\$ per Tonne Diverted</u>

Component Category/ Components	Component Environmental Effects	Mitigation/ Enhancement	Component Net Effects
IC&I Collection – Dry Wastes <ul style="list-style-type: none"> Voluntary source separation of dry recyclables by some IC&I generators Mandatory source separation of designated materials by designated major generators (3Rs regulations) Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers Curbside collection of IC&I recyclables in some areas by municipal forces IC&I depots at transfer stations for use by small business generators Community Recycling Centres for use by small quantity IC&I generators Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) 	<ul style="list-style-type: none"> average of \$50/tonne for collection of IC&I dry wastes some materials have a high market value such that collection costs are covered by hauler/recycler in some circumstances 	<ul style="list-style-type: none"> larger generators can realize cost economies with roll-off bins or front-end loader service source separating materials reduces the cost of collection and processing services although space, staff and storage bins are required 	<ul style="list-style-type: none"> average of \$50/tonne for collection of IC&I dry wastes

<p>IC&I Collection – Wet Wastes</p> <ul style="list-style-type: none"> • Voluntary source separation of IC&I generated organics • Separate collection of IC&I wet wastes 	<ul style="list-style-type: none"> • an average of \$50/tonne for collection • in some cases a higher rate may be charged for food wastes due to high density • higher costs may be incurred as food wastes may require more frequent collection 	<ul style="list-style-type: none"> • higher volumes allow economies of scale to be realized by specific establishments (different storage/collection methods) • higher volumes collected in general may lower costs to all generators 	<ul style="list-style-type: none"> • an average of \$50/tonne for collection
<p>IC&I Processing – Dry Wastes</p> <ul style="list-style-type: none"> • Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities • Processing centres for a wide range of dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs • Processing of IC&I sector recyclables by small private sector recyclers 	<ul style="list-style-type: none"> • processing costs depend on waste material, volumes and handling program • tipping/handling fees charged to generators vary from approximately \$40/tonne for OCC to \$115/tonne for mixed wastes. • some plastics likely have a significantly higher cost for processing due to market value and technical limitations. A representative cost of approximately \$280/tonne has been assumed for this analysis. Some sources have suggested much higher costs. • In municipally-run MRFs, cost typically are in the range of \$40 to \$80 per tonne 	<ul style="list-style-type: none"> • market development may have a positive effect on costs of processing charged to IC&I waste generators • processing larger volumes of wastes may allow economies of scale to be passed on to IC&I waste generators 	<p>tipping/handling fees charged to generators vary from approximately \$40/tonne for OCC to \$115/tonne for mixed wastes.</p>

<p>IC&I Processing – Wet Wastes</p> <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector 	<ul style="list-style-type: none"> \$30/tonne price for windrow composting based on charges at Scotts Farm and other municipally-run composting facilities 	<ul style="list-style-type: none"> windrow composting is a cost-effective method; in-vessel options may have higher costs though economies of scale may be realized and reflected in the price charged to IC&I generators operational improvements may lower costs market development for finished compost and larger volumes may lower costs good source separation will improve compost quality 	<ul style="list-style-type: none"> \$30/tonne price for windrow composting
<p>IC&I Reuse</p> <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, provincial and local waste exchange programs Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators Use of food wastes as animal feed Use of food waste for human consumption Landspreading of IC&I organics Use of refillable containers (refillable bottles, refillable pails or drums, etc.) Use of re-usable packaging (e.g. reusable plastic and wood pallets) 	<ul style="list-style-type: none"> informal reuse occurs at low cost reuse centres may operate at approximately \$50/tonne (to be confirmed) food wastes may be collected at zero cost to the IC&I generator for use as animal feed (confirm) 	<ul style="list-style-type: none"> higher volumes likely would have a positive effect of lowering prices charged to IC&I generators 	<ul style="list-style-type: none"> reuse costs are expected to be relatively low

<p>IC&I Reduction</p> <ul style="list-style-type: none"> • Voluntary waste reduction actions by IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse • Mandatory development of waste reduction action plans by designated major IC&I generators (defined in 3Rs regulations) • Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations) 	<ul style="list-style-type: none"> • difficult to assign a cost to waste reduction initiatives as they can be very diverse and little information is available. • costs may include investment in research (audits and technology development), substitution of more costly materials, shorter shelf-life of non-durable consumer goods which may require more costly operational regimes (retail/wholesale sectors), and others 	<ul style="list-style-type: none"> • Develop systems for monitoring source reduction costs 	<ul style="list-style-type: none"> • limited available data
<p>IC&I Programs</p> <ul style="list-style-type: none"> • Voluntary waste audits performed by IC&I generators • Independent voluntary waste reduction programs in private companies • Mandatory waste audits by designated major IC&I generators (3Rs regulations) • Mandatory packaging audits by designated major packaging generators (3Rs regulations) • Voluntary packaging reporting by packaging users (NAPP) 	<ul style="list-style-type: none"> • waste audits and workplans are site and establishment-specific even for larger corporations. • audits may cost between \$2500 and \$50,000/facility, depending on the size and diversity of activities • For smaller establishments the absolute costs may be less • packaging audits are generally more costly as information on external factors such as recycled content of purchased materials is required. 	<ul style="list-style-type: none"> • provision of support and advisory services may provide cost efficiencies for individual establishments 	<ul style="list-style-type: none"> • costs are expected to be relatively low

<p>IC&I Promotion & Education</p> <ul style="list-style-type: none"> • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations • Mandatory posting of waste reduction plans for review by employees of designated major IC&I generators (3Rs regulations) 	<ul style="list-style-type: none"> • costs are relatively low, typically a few dollars per employee per year • for in-house activities, existing infrastructure may be used, such as newsletters and bulletins for promotion of waste reduction initiatives 	<ul style="list-style-type: none"> • valuable enhancement to improve performance of systems 	<ul style="list-style-type: none"> • considered to be relatively low cost
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Schedule C
TABLE 1
IC&I SYSTEM NET EFFECTS BY COMPONENT

SYSTEM: IC&I Existing/Committed
 CRITERIA GROUP: Cost
 CRITERIA: Total System Cost
 INDICATOR: Total System \$

Component Category/ Components	Component Environmental Effects	Mitigation/ Enhancement	Component Net Effects
IC&I Collection – Dry Wastes <ul style="list-style-type: none"> • Voluntary source separation of dry recyclables by some IC&I generators • Mandatory source separation of designated materials by designated major generators (3Rs regulations) • Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers • Curbside collection of IC&I recyclables in some areas by municipal forces • IC&I depots at transfer stations for use by small business generators • Community Recycling Centres for use by small quantity IC&I generators • Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) 	<ul style="list-style-type: none"> • an estimated total collection system cost for dry waste of \$148 million • dry recyclables total collection cost based on unit cost of approximately \$50/tonne multiplied by the quantities of dry materials recovered • some materials have a high market value such that collection costs are covered by hauler/recycler in some circumstances • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes) 	<ul style="list-style-type: none"> • larger generators can realize cost economies with roll-off bins or front-end loader service • source separating materials reduces the cost of collection and processing services although space, staff and storage bins are required 	<ul style="list-style-type: none"> • an estimated total collection system cost for dry waste of \$148 million • total collection cost for dry recyclables based on unit cost of approximately \$50/tonne multiplied by the quantities of dry materials recovered • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes)

<p>IC&I Collection – Wet Wastes</p> <ul style="list-style-type: none"> • Voluntary source separation of IC&I generated organics • Separate collection of IC&I wet wastes 	<ul style="list-style-type: none"> • an estimated total collection system cost for wet waste of \$14 million • wet organics collection cost based on unit cost of approximately \$50/tonne multiplied by the quantity of wet organics collected • in some cases a higher rate may be charged for food wastes due to high density • higher costs may be incurred as food wastes may require more frequent collection • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes) 	<p>higher volumes allow economies of scale to be realized by specific establishments (different storage/collection methods)</p> <ul style="list-style-type: none"> • higher volumes collected in general may lower costs to all generators 	<ul style="list-style-type: none"> • an estimated total collection system cost for wet waste of \$14 million • wet organics collection cost based on unit cost of approximately \$50/tonne multiplied by the quantity of wet organics collected • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes)
<p>IC&I Processing – Dry Wastes</p> <ul style="list-style-type: none"> • Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities • Processing centres for a wide range of dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs • Processing of IC&I sector recyclables by small private sector recyclers 	<ul style="list-style-type: none"> • an estimated total processing/handling cost for dry recyclables of \$72 million • an estimated total disposal cost for dry waste of \$94 million (@\$50/tonne disposal fee) and \$187 million (@\$100/tonne disposal fee) • tipping/handling fees and processing costs charged to generators depend on waste material, volumes and handling program • total cost of processing dry recyclables based on unit costs for processing different materials (varying from \$40/tonne for OCC to \$115/tonne for mixed wastes) multiplied by the quantities of each material processed. • the quantities diverted and therefore the total cost depend on the capture/participation in the 3Rs regulations and NAPP • cost of disposing residues assumed to be included in tipping fee (one reason why unit cost for mixed waste relatively high) 	<ul style="list-style-type: none"> • market development may have a positive effect on costs of processing charged to IC&I waste generators • processing larger volumes of wastes may allow economies of scale to be passed on to IC&I waste generators 	<ul style="list-style-type: none"> • an estimated total processing/handling cost for dry recyclables of \$72 million • an estimated total disposal cost for dry waste of \$94 million (@\$50/tonne disposal fee) and \$187 million (@\$100/tonne disposal fee) • total cost of processing dry recyclables based on unit costs for processing different materials (varying from \$40/tonne for OCC to \$115/tonne for mixed wastes) multiplied by the quantities of each material processed. • cost of disposing residues assumed to be included in tipping fee

<p>IC&I Processing – Wet Wastes</p> <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector 	<ul style="list-style-type: none"> an estimated total processing/handling cost of \$101,000 for wet waste an estimated total disposal cost for wet waste of \$14 million (@\$50/tonne disposal fee) and \$28 million (@\$100/tonne disposal fee) cost of processing wet wastes based on the unit cost of processing at a centralized facility such as Scotts Farm (approximately \$30/tonne) multiplied by the quantity of wet organics processed the quantities of wet wastes diverted depend on the capture by the 3Rs regulations this may be high as other markets involving different processing methods may have lower associated costs to the generator cost of disposing rejected residues or of unmarketable product, if any, assumed to be included in the price of \$30/tonne 	<ul style="list-style-type: none"> windrow composting is a cost-effective method; in-vessel options may have higher costs though economies of scale may be realized and reflected in the price charged to IC&I generators operational improvements may lower costs strong market revenues for finished compost would lower cost good source separation will improve compost quality 	<ul style="list-style-type: none"> an estimated total processing/handling cost of \$101,000 for wet waste an estimated total disposal cost for wet waste of \$14 million (@\$50/tonne disposal fee) and \$28 million (@\$100/tonne disposal fee) cost of processing wet wastes based on the unit cost of processing at a centralized facility such as Scotts Farm (approximately \$30/tonne) multiplied by the quantity of wet organics processed cost of disposing rejected residues or of unmarketable product, if any, assumed to be included in the price of \$30/tonne
<p>IC&I Reuse</p> <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, provincial and local waste exchange programs Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators Use of food wastes as animal feed Use of food waste for human consumption Landspreading of IC&I organics Use of refillable containers (refillable bottles, refillable pails or drums, etc.) Use of re-usable packaging (e.g. reusable plastic and wood pallets) 	<ul style="list-style-type: none"> costs estimated to be relatively low 	<ul style="list-style-type: none"> higher volumes likely would have a positive effect of lowering prices charged to IC&I generators 	<ul style="list-style-type: none"> costs expected to be low

<p>IC&I Reduction</p> <ul style="list-style-type: none"> • Voluntary waste reduction actions by IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse • Mandatory development of waste reduction action plans by designated major IC&I generators (defined in 3Rs regulations) • Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations) 	<ul style="list-style-type: none"> • difficult to assign a cost to waste reduction initiatives as they can be very diverse and little information is available. • costs may include investment in research (audits and technology development), substitution of more costly materials, shorter shelf-life of non-durable consumer goods which may require more costly operational regimes (retail/wholesale sectors), and others 	<ul style="list-style-type: none"> • Develop systems to monitor source reduction costs 	<ul style="list-style-type: none"> • limited cost data available
<p>IC&I Programs</p> <ul style="list-style-type: none"> • Voluntary waste audits performed by IC&I generators • Independent voluntary waste reduction programs in private companies • Mandatory waste audits by designated major IC&I generators (3Rs regulations) • Mandatory packaging audits by designated major packaging generators (3Rs regulations) • Voluntary packaging reporting by packaging users (NAPP) 	<ul style="list-style-type: none"> • waste audits and workplans are site and establishment-specific even for larger corporations. • audits may cost between \$2500 and \$50,000/facility, depending on the size and diversity of activities • For smaller establishments the absolute costs may be less • packaging audits are generally more costly as information on external factors such as recycled content of purchased materials is required. 	<ul style="list-style-type: none"> • provision of support and advisory services may provide cost efficiencies for individual establishments 	<ul style="list-style-type: none"> • costs are expected to be relatively low

<p>IC&I Promotion & Education</p> <ul style="list-style-type: none"> • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations • Mandatory posting of waste reduction plans for review by employees of designated major IC&I generators (3Rs regulations) 	<ul style="list-style-type: none"> • costs are relatively low, typically a few dollars per employee per year • for in-house activities, existing infrastructure may be used, such as newsletters and bulletins for promotion of waste reduction initiatives 	<ul style="list-style-type: none"> • valuable enhancement to improve performance of systems 	<ul style="list-style-type: none"> • considered to be relatively low cost
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Schedule C
TABLE 1
IC&I SYSTEM NET EFFECTS BY COMPONENT

SYSTEM: IC&I Extended 3Rs Regulations
 CRITERIA GROUP: Cost
 CRITERIA: Total System Cost
 INDICATOR: Total System \$

Component Category/ Components	Component Environmental Effects	Mitigation/ Enhancement	Component Net Effects
IC&I Collection - Dry Wastes <ul style="list-style-type: none"> Mandatory source separation of designated materials by most IC&I generators in GTA (to capture generators of 90% of total IC&I waste - revision to 3Rs regulations) Voluntary source separation of dry recyclables by small IC&I generators Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers Curbside collection of IC&I recyclables in some areas by municipal forces IC&I depots at transfer stations for use by small business generators Community Recycling Centres for use by small quantity IC&I generators Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) 	<ul style="list-style-type: none"> an estimated total collection system cost of \$148 million for dry waste dry recyclables total collection cost based on unit cost of approximately \$50/tonne multiplied by the quantities of dry materials recovered some materials have a high market value such that collection costs are covered by hauler/recycler in some circumstances cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes) 	<ul style="list-style-type: none"> larger generators can realize cost economies with roll-off bins or front-end loader service source separating materials reduces the cost of collection and processing services although space, staff and storage bins are required 	<ul style="list-style-type: none"> an estimated total collection system cost of \$148 million for dry waste total collection cost for dry recyclables based on unit cost of approximately \$50/tonne multiplied by the quantities of dry materials recovered cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes)

<p>IC&I Collection – Wet Wastes</p> <ul style="list-style-type: none"> • Voluntary source separation of IC&I generated organics • Separate collection of IC&I wet wastes 	<ul style="list-style-type: none"> • an estimated total collection system cost of \$14 million for wet waste • wet organics collection cost based on unit cost of approximately \$50/tonne multiplied by the quantity of wet organics collected • in some cases a higher rate may be charged for food wastes due to high density • higher costs may be incurred as food wastes may require more frequent collection • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes) 	<p>higher volumes allow economies of scale to be realized by specific establishments (different storage/collection methods)</p> <ul style="list-style-type: none"> • higher volumes collected in general may lower costs to all generators 	<ul style="list-style-type: none"> • an estimated total collection system cost of \$14 million for wet waste • wet organics collection cost based on unit cost of approximately \$50/tonne multiplied by the quantity of wet organics collected • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes)
<p>IC&I Processing – Dry Wastes</p> <ul style="list-style-type: none"> • <i>Additional processing capacity for dry recyclables required</i> • Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities • Processing centres for a wide range of dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs • Processing of IC&I sector recyclables by small private sector recyclers 	<ul style="list-style-type: none"> • an estimated total processing/handling cost for dry recyclables of \$99 million • an estimated disposal cost for dry waste of \$74 million (@\$50/tonne disposal fee) and \$148 million (@\$100/tonne disposal fee) • tipping/handling fees and processing costs charged to generators depend on waste material, volumes and handling program • total cost of processing dry recyclables based on unit costs for processing different materials (varying from \$40/tonne for OCC to \$115/tonne for mixed wastes) multiplied by the quantities of each material processed. • cost of disposing residues assumed to be included in tipping fee (one reason why unit cost for mixed waste relatively high) 	<ul style="list-style-type: none"> • market development may have a positive effect on costs of processing charged to IC&I waste generators • processing larger volumes of wastes may allow economies of scale to be passed on to IC&I waste generators 	<ul style="list-style-type: none"> • an estimated total processing/handling cost for dry recyclables of \$99 million • an estimated disposal cost for dry waste of \$74 million (@\$50/tonne disposal fee) and \$148 million (@\$100/tonne disposal fee) • total cost of processing dry recyclables based on unit costs for processing different materials (varying from \$40/tonne for OCC to \$115/tonne for mixed wastes) multiplied by the quantities of each material processed. • cost of disposing residues assumed to be included in tipping fee

<p>IC&I Processing – Wet Wastes</p> <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector 	<ul style="list-style-type: none"> an estimated total processing/handling cost of \$101,000 cost of processing wet wastes based on the unit cost of processing at a centralized facility such as Scotts Farm (approximately \$30/tonne) multiplied by the quantity of wet organics processed this may be high as other markets involving different processing methods may have lower associated costs to the generator cost of disposing rejected residues or of unmarketable product, if any, assumed to be included in the price of \$30/tonne an estimated total disposal cost of \$14 million for wet waste @ \$50/tonne an estimated total disposal cost of \$25 million for wet waste @\$100/tonne 	<ul style="list-style-type: none"> windrow composting is a cost-effective method; in-vessel options may have higher costs though economies of scale may be realized and reflected in the price charged to IC&I generators operational improvements may lower costs strong market revenues for finished compost would lower cost good source separation will improve compost quality 	<ul style="list-style-type: none"> an estimated total processing/handling cost of \$101,000 cost of processing wet wastes based on the unit cost of processing at a centralized facility such as Scotts Farm (approximately \$30/tonne) multiplied by the quantity of wet organics processed cost of disposing rejected residues or of unmarketable product, if any, assumed to be included in the price of \$30/tonne
<p>IC&I Reuse</p> <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators Use of food wastes as animal feed Use of food waste for human consumption Landspreading of IC&I organics Use of refillable containers (refillable bottles, refillable pails or drums) Use of re-usable packaging (e.g. reusable plastic and wood pallets) 	<ul style="list-style-type: none"> costs estimated to be relatively low 	<ul style="list-style-type: none"> higher volumes likely would have a positive effect of lowering prices charged to IC&I generators 	<ul style="list-style-type: none"> costs expected to be low

<p>IC&I Reduction</p> <ul style="list-style-type: none"> • Voluntary waste reduction actions by IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse • <i>Mandatory development of waste reduction action plans by most IC&I generators (revision to 3Rs regulations)</i> • Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations) 	<ul style="list-style-type: none"> • difficult to assign a cost to waste reduction initiatives as they can be very diverse and little information is available. • costs may include investment in research (audits and technology development), substitution of more costly materials, shorter shelf-life of non-durable consumer goods which may require more costly operational regimes (retail/wholesale sectors), and others 	<ul style="list-style-type: none"> • Develop systems to monitor source reduction costs 	<ul style="list-style-type: none"> • limited cost data available
<p>IC&I Programs</p> <ul style="list-style-type: none"> • Voluntary waste audits performed by small IC&I generators • Independent voluntary waste reduction programs in private companies • <i>Mandatory waste audits by most IC&I generators (revision to 3Rs regulations)</i> • Mandatory packaging audits by designated major packaging generators (3Rs regulations) • Voluntary packaging reporting by packaging users (NAPP) 	<ul style="list-style-type: none"> • waste audits and workplans are site and establishment-specific even for larger corporations. • audits may cost between \$2500 and \$50,000/facility, depending on the size and diversity of activities • For smaller establishments the absolute costs may be less • packaging audits are generally more costly as information on external factors such as recycled content of purchased materials is required. 	<ul style="list-style-type: none"> • provision of support and advisory services may provide cost efficiencies for individual establishments 	<ul style="list-style-type: none"> • costs are expected to be relatively low

<p>IC&I Promotion & Education</p> <ul style="list-style-type: none"> • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations • <i>Mandatory posting of waste reduction plans for review by employees of most IC&I generators (revision to 3Rs regulations)</i> 	<ul style="list-style-type: none"> • costs are relatively low, typically a few dollars per employee per year • for in-house activities, existing infrastructure may be used, such as newsletters and bulletins for promotion of waste reduction initiatives 	<ul style="list-style-type: none"> • valuable enhancement to improve performance of systems 	<ul style="list-style-type: none"> • considered to be relatively low cost
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Schedule C
TABLE 1
IC&I SYSTEM NET EFFECTS BY COMPONENT

SYSTEM: IC&I Expanded 3Rs Regulations
 CRITERIA GROUP: Cost
 CRITERIA: Total System Cost
 INDICATOR: Total System \$

Component Category/ Components	Component Environmental Effects	Mitigation/ Enhancement	Component Net Effects
IC&I Collection - Dry Wastes <ul style="list-style-type: none"> • Voluntary source separation of dry recyclables by some small IC&I generators • <i>Mandatory source separation of expanded list of designated materials by most IC&I generators (to capture generators of 90% of total IC&I waste - revision to 3Rs regulations)</i> • Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers • Curbside collection of IC&I recyclables in some areas by municipal forces • IC&I depots at transfer stations for use by small business generators • Community Recycling Centres for use by small quantity IC&I generators • Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) 	<ul style="list-style-type: none"> • an estimated total collection system cost of \$148 million for dry waste • dry recyclables total collection cost based on unit cost of approximately \$50/tonne multiplied by the quantities of dry materials recovered • some materials have a high market value such that collection costs are covered by hauler/recycler in some circumstances • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes) 	<ul style="list-style-type: none"> • larger generators can realize cost economies with roll-off bins or front-end loader service • source separating materials reduces the cost of collection and processing services although space, staff and storage bins are required 	<ul style="list-style-type: none"> • an estimated total collection system cost of \$148 million for dry waste • total collection cost for dry recyclables based on unit cost of approximately \$50/tonne multiplied by the quantities of dry materials recovered • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes)

<p>IC&I Collection – Wet Wastes</p> <ul style="list-style-type: none"> • Voluntary source separation of IC&I generated organics • Separate collection of IC&I wet wastes 	<ul style="list-style-type: none"> • an estimated total collection system cost for wet waste of \$14 million • wet organics collection cost based on unit cost of approximately \$50/tonne multiplied by the quantity of wet organics collected • in some cases a higher rate may be charged for food wastes due to high density • higher costs may be incurred as food wastes may require more frequent collection • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes) 	<p>higher volumes allow economies of scale to be realized by specific establishments (different storage/collection methods)</p> <ul style="list-style-type: none"> • higher volumes collected in general may lower costs to all generators 	<ul style="list-style-type: none"> • an estimated total collection system cost for wet waste of \$14 million • wet organics collection cost based on unit cost of approximately \$50/tonne multiplied by the quantity of wet organics collected • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes)
<p>IC&I Processing – Dry Wastes</p> <ul style="list-style-type: none"> • <i>Additional processing capacity for wider list of dry materials required</i> • Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities • Processing centres for dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs • Processing of IC&I sector recyclables by small private sector recyclers 	<ul style="list-style-type: none"> • an estimated total processing/handling cost of \$123 million for dry waste • an estimated total disposal cost of \$61 million (@\$50/tonne disposal fee) and \$121 (@\$100/tonne disposal fee) • tipping/handling fees and processing costs charged to generators depend on waste material, volumes and handling program • total cost of processing dry recyclables based on unit costs for processing different materials (varying from \$40/tonne for OCC to \$115/tonne for mixed wastes) multiplied by the quantities of each material processed. • cost of disposing residues assumed to be included in tipping fee (one reason why unit cost for mixed waste relatively high) 	<ul style="list-style-type: none"> • market development may have a positive effect on costs of processing charged to IC&I waste generators • processing larger volumes of wastes may allow economies of scale to be passed on to IC&I waste generators 	<ul style="list-style-type: none"> • an estimated total processing/handling cost of \$123 million for dry waste • an estimated total disposal cost of \$61 million (@\$50/tonne disposal fee) and \$121 (@\$100/tonne disposal fee) • total cost of processing dry recyclables based on unit costs for processing different materials (varying from \$40/tonne for OCC to \$115/tonne for mixed wastes) multiplied by the quantities of each material processed. • cost of disposing residues assumed to be included in tipping fee

<p>IC&I Processing – Wet Wastes</p> <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector 	<ul style="list-style-type: none"> an estimated total processing/handling cost of \$101,000 million for wet waste an estimated total disposal cost of \$14 million for wet waste (@\$50/tonne disposal fee) and \$28 (@\$100/tonne disposal fee) cost of processing wet wastes based on the unit cost of processing at a centralized facility such as Scotts Farm (approximately \$30/tonne) multiplied by the quantity of wet organics processed this may be high as other markets involving different processing methods may have lower associated costs to the generator cost of disposing rejected residues or of unmarketable product, if any, assumed to be included in the price of \$30/tonne 	<ul style="list-style-type: none"> windrow composting is a cost-effective method; in-vessel options may have higher costs though economies of scale may be realized and reflected in the price charged to IC&I generators operational improvements may lower costs strong market revenues for finished compost would lower cost good source separation will improve compost quality 	<ul style="list-style-type: none"> an estimated total processing/handling cost of \$101,000 million for wet waste an estimated total disposal cost of \$14 million for wet waste (@\$50/tonne disposal fee) and \$28 (@\$100/tonne disposal fee) cost of processing wet wastes based on the unit cost of processing at a centralized facility such as Scotts Farm (approximately \$30/tonne) multiplied by the quantity of wet organics processed cost of disposing rejected residues or of unmarketable product, if any, assumed to be included in the price of \$30/tonne
<p>IC&I Reuse</p> <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators Use of food wastes as animal feed Use of food waste for human consumption Landspreading of IC&I organics Use of refillable containers (refillable bottles, refillable pails or drums) Use of re-usable packaging (e.g. reusable plastic and wood pallets) 	<ul style="list-style-type: none"> costs estimated to be relatively low 	<ul style="list-style-type: none"> higher volumes likely would have a positive effect of lowering prices charged to IC&I generators 	<ul style="list-style-type: none"> costs expected to be low

<p>IC&I Reduction</p> <ul style="list-style-type: none"> • Voluntary waste reduction actions by small IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse • <i>Mandatory development of waste reduction action plans by most IC&I generators (revision to 3Rs regulations)</i> • Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations) 	<ul style="list-style-type: none"> • difficult to assign a cost to waste reduction initiatives as they can be very diverse and little information is available. • costs may include investment in research (audits and technology development), substitution of more costly materials, shorter shelf-life of non-durable consumer goods which may require more costly operational regimes (retail/wholesale sectors), and others 	<ul style="list-style-type: none"> • Develop systems to monitor source reduction costs 	<ul style="list-style-type: none"> • limited cost data available
<p>IC&I Programs</p> <ul style="list-style-type: none"> • Voluntary waste audits performed by small IC&I generators • Independent voluntary waste reduction programs in private companies • <i>Mandatory waste audits by most IC&I generators (revision to 3Rs regulations)</i> • Mandatory packaging audits by designated major packaging generators (3Rs regulations) • Voluntary packaging reporting by packaging users (NAPP) 	<ul style="list-style-type: none"> • waste audits and workplans are site and establishment-specific even for larger corporations. • audits may cost between \$2500 and \$50,000/facility, depending on the size and diversity of activities • For smaller establishments the absolute costs may be less • packaging audits are generally more costly as information on external factors such as recycled content of purchased materials is required. 	<ul style="list-style-type: none"> • provision of support and advisory services may provide cost efficiencies for individual establishments 	<ul style="list-style-type: none"> • costs are expected to be relatively low

<p>IC&I Promotion & Education</p> <ul style="list-style-type: none"> • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations • <i>Mandatory posting of waste reduction plans for review by employees of most IC&I generators (revision to 3Rs regulations)</i> 	<ul style="list-style-type: none"> • costs are relatively low, typically a few dollars per employee per year • for in-house activities, existing infrastructure may be used, such as newsletters and bulletins for promotion of waste reduction initiatives 	<ul style="list-style-type: none"> • valuable enhancement to improve performance of systems 	<ul style="list-style-type: none"> • considered to be relatively low cost
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Schedule C
TABLE 1
IC&I SYSTEM NET EFFECTS BY COMPONENT

SYSTEM: IC&I Expanded 3Rs Regulations with Organics
 CRITERIA GROUP: Cost
 CRITERIA: Cost per Tonne Diverted
 INDICATOR: \$ per Tonne Diverted

Component Category/ Components	Component Environmental Effects	Mitigation/ Enhancement	Component Net Effects
IC&I Collection – Dry Wastes <ul style="list-style-type: none"> • Voluntary source separation of dry recyclables by small IC&I generators • <i>Mandatory source separation of expanded list of designated materials by most generators (to capture generators of 90% of total IC&I waste - revision to 3Rs regulations)</i> • Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers • Curbside collection of IC&I recyclables in some areas by municipal forces • IC&I depots at transfer stations for use by small business generators • Community Recycling Centres for use by small quantity IC&I generators • Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) 	<ul style="list-style-type: none"> • average of \$50/tonne for collection of IC&I dry wastes • some materials have a high market value such that collection costs are covered by hauler/recycler in some circumstances 	<ul style="list-style-type: none"> • larger generators can realize cost economies with roll-off bins or front-end loader service • source separating materials reduces the cost of collection and processing services although space, staff and storage bins are required 	<ul style="list-style-type: none"> • average of \$50/tonne for collection of IC&I dry wastes

<p>IC&I Collection – Wet Wastes</p> <ul style="list-style-type: none"> • <i>Mandatory source separation of wet wastes by designed IC&I generators (revision to 3Rs regulations)</i> • Voluntary source separation of IC&I generated organics • Separate collection of IC&I wet wastes 	<ul style="list-style-type: none"> • an average of \$50/tonne for collection • in some cases a higher rate may be charged for food wastes due to high density • higher costs may be incurred as food wastes may require more frequent collection 	<ul style="list-style-type: none"> • higher volumes allow economies of scale to be realized by specific establishments (different storage/collection methods) • higher volumes collected in general may lower costs to all generators 	<ul style="list-style-type: none"> • an average of \$50/tonne for collection
<p>IC&I Processing – Dry Wastes</p> <ul style="list-style-type: none"> • <i>Additional processing capacity for dry recyclables</i> • Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities • Processing centres for dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs • Processing of IC&I sector recyclables by small private sector recyclers 	<ul style="list-style-type: none"> • processing costs depend on waste material, volumes and handling program • tipping/handling fees charged to generators vary from approximately \$40/tonne for OCC to \$115/tonne for mixed wastes. • some plastics likely have a significantly higher cost for processing due to market value and technical limitations. A representative cost of approximately \$280/tonne has been assumed for this analysis. Some sources have suggested much higher costs. • In municipally-run MRFs, cost typically are in the range of \$40 to \$80 per tonne 	<ul style="list-style-type: none"> • market development may have a positive effect on costs of processing charged to IC&I waste generators • processing larger volumes of wastes may allow economies of scale to be passed on to IC&I waste generators 	<p>tipping/handling fees charged to generators vary from approximately \$40/tonne for OCC to \$115/tonne for mixed wastes.</p>

<p>IC&I Processing – Wet Wastes</p> <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Centralized composting of IC&I organics in in-vessel system Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector <i>New composting facility (in-vessel) for IC&I organics</i> 	<ul style="list-style-type: none"> \$30/tonne price for windrow composting based on charges at Scotts Farm and other municipally-run composting facilities 	<ul style="list-style-type: none"> windrow composting is a cost-effective method; in-vessel options may have higher costs though economies of scale may be realized and reflected in the price charged to IC&I generators operational improvements may lower costs market development for finished compost and larger volumes may lower costs good source separation will improve compost quality 	<ul style="list-style-type: none"> \$30/tonne price for windrow composting
<p>IC&I Reuse</p> <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators <i>Increased use of food wastes as animal feed</i> <i>Increased use of food waste for human consumption</i> <i>Increased landspreading of IC&I organics</i> Use of refillable containers such as packaging by businesses (refillable bottles, refillable pails or drums, etc.) Use of re-usable packaging (e.g. reusable plastic and wood pallets) 	<ul style="list-style-type: none"> informal reuse occurs at low cost reuse centres may operate at approximately \$50/tonne (to be confirmed) food wastes may be collected at zero cost to the IC&I generator for use as animal feed (confirm) 	<ul style="list-style-type: none"> higher volumes likely would have a positive effect of lowering prices charged to IC&I generators 	<ul style="list-style-type: none"> reuse costs are expected to be relatively low

<p>IC&I Reduction</p> <ul style="list-style-type: none"> • Voluntary waste reduction actions by small IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse • <i>Mandatory development of waste reduction action plans by most IC&I generators (revision to 3Rs regulations)</i> • Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations) 	<ul style="list-style-type: none"> • difficult to assign a cost to waste reduction initiatives as they can be very diverse and little information is available. • costs may include investment in research (audits and technology development), substitution of more costly materials, shorter shelf-life of non-durable consumer goods which may require more costly operational regimes (retail/wholesale sectors), and others 	<ul style="list-style-type: none"> • Develop systems for monitoring source reduction costs 	<ul style="list-style-type: none"> • limited available data
<p>IC&I Programs</p> <ul style="list-style-type: none"> • Voluntary waste audits performed by small IC&I generators • Independent voluntary waste reduction programs in small private companies • <i>Mandatory waste audits by most IC&I generators (revision to 3Rs regulations)</i> • Mandatory packaging audits by designated major packaging generators (3Rs regulations) • Voluntary packaging reporting by packaging users (NAPP) 	<ul style="list-style-type: none"> • waste audits and workplans are site and establishment-specific even for larger corporations. • audits may cost between \$2500 and \$50,000/facility, depending on the size and diversity of activities • For smaller establishments the absolute costs may be less • packaging audits are generally more costly as information on external factors such as recycled content of purchased materials is required. 	<ul style="list-style-type: none"> • provision of support and advisory services may provide cost efficiencies for individual establishments 	<ul style="list-style-type: none"> • costs are expected to be relatively low

<p>IC&I Promotion & Education</p> <ul style="list-style-type: none"> • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations • <i>Mandatory posting of waste reduction plans for review by employees of most IC&I generators (revision to 3Rs regulations)</i> 	<ul style="list-style-type: none"> • costs are relatively low, typically a few dollars per employee per year • for in-house activities, existing infrastructure may be used, such as newsletters and bulletins for promotion of waste reduction initiatives 	<ul style="list-style-type: none"> • valuable enhancement to improve performance of systems 	<ul style="list-style-type: none"> • considered to be relatively low cost
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Schedule C
TABLE 1
IC&I SYSTEM NET EFFECTS BY COMPONENT

SYSTEM: IC&I Expanded 3Rs Regulations with Organics
 CRITERIA GROUP: Cost
 CRITERIA: Total System Cost
 INDICATOR: Total System \$

Component Category/ Components	Component Environmental Effects	Mitigation/ Enhancement	Component Net Effects
IC&I Collection - Dry Wastes <ul style="list-style-type: none"> • Voluntary source separation of dry recyclables by small IC&I generators • <i>Mandatory source separation of expanded list of designated materials by most generators (to capture generators of 90% of total IC&I waste - revision to 3Rs regulations)</i> • Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers • Curbside collection of IC&I recyclables in some areas by municipal forces • IC&I depots at transfer stations for use by small business generators • Community Recycling Centres for use by small quantity IC&I generators • Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) 	<ul style="list-style-type: none"> • an estimated total collection system cost of \$148 million for dry waste • dry recyclables total collection cost based on unit cost of approximately \$50/tonne multiplied by the quantities of dry materials recovered • some materials have a high market value such that collection costs are covered by hauler/recycler in some circumstances • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes) 	<ul style="list-style-type: none"> • larger generators can realize cost economies with roll-off bins or front-end loader service • source separating materials reduces the cost of collection and processing services although space, staff and storage bins are required 	<ul style="list-style-type: none"> • an estimated total collection system cost of \$148 million for dry waste • total collection cost for dry recyclables based on unit cost of approximately \$50/tonne multiplied by the quantities of dry materials recovered • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes)

<p>IC&I Collection – Wet Wastes</p> <ul style="list-style-type: none"> • <i>Mandatory source separation of wet wastes by designed IC&I generators (revision to 3Rs regulations)</i> • Voluntary source separation of IC&I generated organics • Separate collection of IC&I wet wastes 	<ul style="list-style-type: none"> • an estimated total collection system cost of \$14 million for wet waste • wet organics collection cost based on unit cost of approximately \$50/tonne multiplied by the quantity of wet organics collected • in some cases a higher rate may be charged for food wastes due to high density • higher costs may be incurred as food wastes may require more frequent collection • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes) 	<p>higher volumes allow economies of scale to be realized by specific establishments (different storage/collection methods)</p> <ul style="list-style-type: none"> • higher volumes collected in general may lower costs to all generators 	<ul style="list-style-type: none"> • an estimated total collection system cost of \$14 million for wet waste • wet organics collection cost based on unit cost of approximately \$50/tonne multiplied by the quantity of wet organics collected • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes)
<p>IC&I Processing – Dry Wastes</p> <ul style="list-style-type: none"> • <i>Additional processing capacity for dry recyclables</i> • Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities • Processing centres for dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs • Processing of IC&I sector recyclables by small private sector recyclers 	<ul style="list-style-type: none"> • an estimated total processing/handling cost of \$123 million for dry waste • an estimated total disposal cost of \$61 million (@\$50/tonne disposal fee) and \$121 million (@\$100/tonne disposal fee) • tipping/handling fees and processing costs charged to generators depend on waste material, volumes and handling program • total cost of processing dry recyclables based on unit costs for processing different materials (varying from \$40/tonne for OCC to \$115/tonne for mixed wastes) multiplied by the quantities of each material processed. • cost of disposing residues assumed to be included in tipping fee (one reason why unit cost for mixed waste relatively high) 	<ul style="list-style-type: none"> • market development may have a positive effect on costs of processing charged to IC&I waste generators • processing larger volumes of wastes may allow economies of scale to be passed on to IC&I waste generators 	<ul style="list-style-type: none"> • an estimated total processing/handling cost of \$123 million for dry waste • an estimated total disposal cost of \$61 million (@\$50/tonne disposal fee) and \$121 million (@\$100/tonne disposal fee) • total cost of processing dry recyclables based on unit costs for processing different materials (varying from \$40/tonne for OCC to \$115/tonne for mixed wastes) multiplied by the quantities of each material processed. • cost of disposing residues assumed to be included in tipping fee

<p>IC&I Processing – Wet Wastes</p> <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Centralized composting of IC&I organics in in-vessel system Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector <i>New composting facility (in-vessel) for IC&I organics</i> 	<ul style="list-style-type: none"> an estimated total processing/handling cost of \$8 million for wet waste an estimated total disposal cost of \$3.5 million (@\$50/tonne disposal fee) and \$7 million (@\$100/tonne disposal fee) for wet waste cost of processing wet wastes based on the unit cost of processing at a centralized facility such as Scotts Farm (approximately \$30/tonne) multiplied by the quantity of wet organics processed this may be high as other markets involving different processing methods may have lower associated costs to the generator cost of disposing rejected residues or of unmarketable product, if any, assumed to be included in the price of \$30/tonne 	<ul style="list-style-type: none"> windrow composting is a cost-effective method; in-vessel options may have higher costs though economies of scale may be realized and reflected in the price charged to IC&I generators operational improvements may lower costs strong market revenues for finished compost would lower cost good source separation will improve compost quality 	<ul style="list-style-type: none"> an estimated total processing/handling cost of \$8 million for wet waste an estimated total disposal cost of \$3.5 million (@\$50/tonne disposal fee) and \$7 million (@\$100/tonne disposal fee) for wet waste cost of processing wet wastes based on the unit cost of processing at a centralized facility such as Scotts Farm (approximately \$30/tonne) multiplied by the quantity of wet organics processed cost of disposing rejected residues or of unmarketable product, if any, assumed to be included in the price of \$30/tonne
<p>IC&I Reuse</p> <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators <i>Increased use of food wastes as animal feed</i> <i>Increased use of food waste for human consumption</i> <i>Increased landspreading of IC&I organics</i> Use of refillable containers such as packaging by businesses (refillable bottles, refillable pails or drums, etc.) Use of re-usable packaging (e.g. reusable plastic and wood pallets) 	<ul style="list-style-type: none"> costs estimated to be relatively low 	<ul style="list-style-type: none"> higher volumes likely would have a positive effect of lowering prices charged to IC&I generators 	<ul style="list-style-type: none"> costs expected to be low

<p>IC&I Reduction</p> <ul style="list-style-type: none"> • Voluntary waste reduction actions by small IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse • <i>Mandatory development of waste reduction action plans by most IC&I generators (revision to 3Rs regulations)</i> • Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations) 	<ul style="list-style-type: none"> • difficult to assign a cost to waste reduction initiatives as they can be very diverse and little information is available. • costs may include investment in research (audits and technology development), substitution of more costly materials, shorter shelf-life of non-durable consumer goods which may require more costly operational regimes (retail/wholesale sectors), and others 	<ul style="list-style-type: none"> • Develop systems to monitor source reduction costs 	<ul style="list-style-type: none"> • limited cost data available
<p>IC&I Programs</p> <ul style="list-style-type: none"> • Voluntary waste audits performed by small IC&I generators • Independent voluntary waste reduction programs in small private companies • <i>Mandatory waste audits by most IC&I generators (revision to 3Rs regulations)</i> • Mandatory packaging audits by designated major packaging generators (3Rs regulations) • Voluntary packaging reporting by packaging users (NAPP) 	<ul style="list-style-type: none"> • waste audits and workplans are site and establishment-specific even for larger corporations. • audits may cost between \$2500 and \$50,000/facility, depending on the size and diversity of activities • For smaller establishments the absolute costs may be less • packaging audits are generally more costly as information on external factors such as recycled content of purchased materials is required. 	<ul style="list-style-type: none"> • provision of support and advisory services may provide cost efficiencies for individual establishments 	<ul style="list-style-type: none"> • costs are expected to be relatively low

<p>IC&I Promotion & Education</p> <ul style="list-style-type: none"> • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations • <i>Mandatory posting of waste reduction plans for review by employees of most IC&I generators (revision to 3Rs regulations)</i> 	<ul style="list-style-type: none"> • costs are relatively low, typically a few dollars per employee per year • for in-house activities, existing infrastructure may be used, such as newsletters and bulletins for promotion of waste reduction initiatives 	<ul style="list-style-type: none"> • valuable enhancement to improve performance of systems 	<ul style="list-style-type: none"> • considered to be relatively low cost
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Schedule C
TABLE 1
IC&I SYSTEM NET EFFECTS BY COMPONENT

SYSTEM: IC&I No Unprocessed Waste to Landfill
 CRITERIA GROUP: Cost
 CRITERIA: Cost per Tonne Diverted
 INDICATOR: \$ per Tonne Diverted

Component Category/ Components	Component Environmental Effects	Mitigation/ Enhancement	Component Net Effects
IC&I Collection - Dry Wastes <ul style="list-style-type: none"> Voluntary source separation of dry recyclables by small IC&I generators Mandatory source separation of designated materials by designated major generators (3Rs regulations) Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers Curbside collection of IC&I recyclables in some areas by municipal forces IC&I depots at transfer stations for use by small business generators Community Recycling Centres for use by small quantity IC&I generators Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) Mandatory processing of all dry wastes prior to landfilling (new policy required by Ontario, or condition on C of A for landfill) 	<ul style="list-style-type: none"> average of \$50/tonne for collection of IC&I dry wastes some materials have a high market value such that collection costs are covered by hauler/recycler in some circumstances various programs likely would be established including the collection of source separated materials and garbage as well as programs which involve collection of mixed wastes with limited source separation (possibly only wet dry) to be processed at another facility programs would depend on the particular circumstances of the generator, storage space, types and quantities of waste materials generated 	<ul style="list-style-type: none"> larger generators can realize cost economies with roll-off bins or front-end loader service source separating materials may reduce the cost of collection and processing services although space, staff and storage bins are required 	<ul style="list-style-type: none"> average of \$50/tonne for collection of IC&I dry wastes

<p>IC&I Collection – Wet Wastes</p> <ul style="list-style-type: none"> • Voluntary source separation of IC&I generated organics • Separate collection of some IC&I wet wastes 	<ul style="list-style-type: none"> • an average of \$50/tonne for collection • in some cases a higher rate may be charged for food wastes due to high density • higher costs may be incurred as food wastes may require more frequent collection 	<ul style="list-style-type: none"> • higher volumes allow economies of scale to be realized by specific establishments (different storage/collection methods) • higher volumes collected in general may lower costs to all generators 	<ul style="list-style-type: none"> • an average of \$50/tonne for collection
<p>IC&I Processing – Dry Wastes</p> <ul style="list-style-type: none"> • Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities. • Processing centres for dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs • Processing of IC&I sector recyclables by small private sector recyclers • <i>Mandatory processing of all dry wastes prior to landfilling (new policy)</i> • <i>Mandatory processing of all mixed wastes prior to landfilling (new policy)</i> • <i>Additional facilities for processing dry recyclables</i> • <i>Additional facilities for processing mixed wastes</i> 	<ul style="list-style-type: none"> • processing costs depend on waste material, volumes and handling program • tipping/handling fees charged to generators vary from approximately \$40/tonne for OCC to \$115/tonne for mixed wastes. • costs will depend on the type of program as well as the type of materials. Handling of mixed wastes, which involves more processing by processors and recyclers, likely would involve a higher collection/disposal price charged to the generator • some plastics likely have a significantly higher cost for processing due to market value and technical limitations. A representative cost of approximately \$280/tonne has been assumed for this analysis. Some sources have suggested much higher costs. • In municipally-run MRFs, cost typically are in the range of \$40 to \$80 per tonne 	<ul style="list-style-type: none"> • market development may have a positive effect on costs of processing charged to IC&I waste generators • processing larger volumes of wastes may allow economies of scale to be passed on to IC&I waste generators 	<p>tipping/handling fees charged to generators vary from approximately \$40/tonne for OCC to \$115/tonne for mixed wastes.</p>

<p>IC&I Processing – Wet Wastes</p> <ul style="list-style-type: none"> • Centralized windrow composting of source-separated IC&I organics • On-site composting of source separated organics generated by the IC&I sector • Vermicomposting at some IC&I locations • Rendering of food wastes from IC&I sector • <i>New composting facility (in-vessel) for IC&I organics</i> 	<ul style="list-style-type: none"> • \$30/tonne price for windrow composting based on charges at Scotts Farm and other municipally-run composting facilities 	<ul style="list-style-type: none"> • windrow composting is a cost-effective method; • in-vessel options may have higher costs though economies of scale may be realized and reflected in the price charged to IC&I generators • operational improvements may lower costs • market development for finished compost and larger volumes may lower costs • good source separation will improve compost quality 	<ul style="list-style-type: none"> • \$30/tonne price for windrow composting
<p>IC&I Reuse</p> <ul style="list-style-type: none"> • Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs • Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators • Use of food wastes as animal feed • Use of food waste for human consumption • Landspreading of IC&I organics • Use of refillable containers (refillable bottles, refillable pails or drums, etc) • Use of re-usable packaging (e.g. reusable plastic and wood pallets, etc.) 	<ul style="list-style-type: none"> • informal reuse occurs at low cost • reuse centres may operate at approximately \$50/tonne (to be confirmed) • food wastes may be collected at zero cost to the IC&I generator for use as animal feed (confirm) 	<ul style="list-style-type: none"> • higher volumes likely would have a positive effect of lowering prices charged to IC&I generators 	<ul style="list-style-type: none"> • reuse costs are expected to be relatively low

<p>IC&I Reduction</p> <ul style="list-style-type: none"> • voluntary waste reduction actions by small IC&I generators. • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse • Mandatory development of waste reduction action plans by designated major IC&I generators (defined in 3Rs regulations). • Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations). 	<ul style="list-style-type: none"> • difficult to assign a cost to waste reduction initiatives as they can be very diverse and little information is available. • costs may include investment in research (audits and technology development), substitution of more costly materials, shorter shelf-life of non-durable consumer goods which may require more costly operational regimes (retail/wholesale sectors), and others 	<ul style="list-style-type: none"> • Develop systems for monitoring source reduction costs 	<ul style="list-style-type: none"> • limited available data
<p>IC&I Programs</p> <ul style="list-style-type: none"> • Voluntary waste audits performed by small IC&I generators • Independent voluntary waste reduction programs in small private companies • Mandatory waste audits by designated major IC&I generators (defined in 3Rs regulations) • Mandatory packaging audits by designated major packaging generators (3Rs regulations) • Voluntary packaging reporting by packaging users (NAPP) 	<ul style="list-style-type: none"> • waste audits and workplans are site and establishment-specific even for larger corporations. • audits may cost between \$2500 and \$50,000/facility, depending on the size and diversity of activities • For smaller establishments the absolute costs may be less • packaging audits are generally more costly as information on external factors such as recycled content of purchased materials is required. 	<ul style="list-style-type: none"> • provision of support and advisory services may provide cost efficiencies for individual establishments 	<ul style="list-style-type: none"> • costs are expected to be relatively low

<p>IC&I Promotion & Education</p> <ul style="list-style-type: none"> • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations • Mandatory posting of waste reduction plans for review by employees of designated major IC&I generators (3Rs regulations) 	<ul style="list-style-type: none"> • costs are relatively low, typically a few dollars per employee per year • for in-house activities, existing infrastructure may be used, such as newsletters and bulletins for promotion of waste reduction initiatives 	<ul style="list-style-type: none"> • valuable enhancement to improve performance of systems 	<ul style="list-style-type: none"> • considered to be relatively low cost
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Schedule C
TABLE 1
IC&I SYSTEM NET EFFECTS BY COMPONENT

SYSTEM: IC&I No Unprocessed Waste to Landfill
 CRITERIA GROUP: Cost
 CRITERIA: Total System Cost
 INDICATOR: Total System \$

Component Category/ Components	Component Environmental Effects	Mitigation/ Enhancement	Component Net Effects
IC&I Collection – Dry Wastes <ul style="list-style-type: none"> • Voluntary source separation of dry recyclables by small IC&I generators • Mandatory source separation of designated materials by designated major generators (3Rs regulations) • Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers • Curbside collection of IC&I recyclables in some areas by municipal forces • IC&I depots at transfer stations for use by small business generators • Community Recycling Centres for use by small quantity IC&I generators • Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) • <i>Mandatory processing of all dry wastes prior to landfilling (new policy required by Ontario, or condition on C of A for landfill)</i> 	<ul style="list-style-type: none"> • an estimated total collection cost of \$148 million for dry waste • dry recyclables total collection cost based on unit cost of approximately \$50/tonne multiplied by the quantities of dry materials recovered • some materials have a high market value such that collection costs are covered by hauler/recycler in some circumstances • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes) • various programs likely would be established including the collection of source separated materials and garbage as well as collection of mixed wastes with limited source separation (possibly only wet dry) to be processed at another facility • programs would depend on the particular circumstances of the generator, storage space, types and quantities of waste materials generated 	<ul style="list-style-type: none"> • larger generators can realize cost economies with roll-off bins or front-end loader service • source separating materials may reduce the cost of collection and processing services although space, staff and storage bins are required 	<ul style="list-style-type: none"> • an estimated total collection cost of \$148 million for dry waste • total collection cost for dry recyclables based on unit cost of approximately \$50/tonne multiplied by the quantities of dry materials recovered • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes)

<p>IC&I Collection - Wet Wastes</p> <ul style="list-style-type: none"> • Voluntary source separation of IC&I generated organics • Separate collection of some IC&I wet wastes 	<ul style="list-style-type: none"> • an estimated total collection cost of \$14 million for wet waste • wet organics collection cost based on unit cost of approximately \$50/tonne multiplied by the quantity of wet organics collected • in some cases a higher rate may be charged for food wastes due to high density • higher costs may be incurred as food wastes may require more frequent collection • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes) 	<p>higher volumes allow economies of scale to be realized by specific establishments (different storage/collection methods)</p> <ul style="list-style-type: none"> • higher volumes collected in general may lower costs to all generators 	<ul style="list-style-type: none"> • an estimated total collection cost of \$14 million for wet waste • wet organics collection cost based on unit cost of approximately \$50/tonne multiplied by the quantity of wet organics collected • cost of collection of garbage (not source separated) is based on a unit collection cost of approximately \$50/tonne multiplied by the quantity of garbage collected (# tonnes)
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<p>IC&I Processing - Dry Wastes</p> <ul style="list-style-type: none"> • Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities. • Processing centres for dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs • Processing of IC&I sector recyclables by small private sector recyclers • <i>Mandatory processing of all dry wastes prior to landfilling (new policy)</i> • <i>Mandatory processing of all mixed wastes prior to landfilling (new policy)</i> • <i>Additional facilities for processing dry recyclables</i> • <i>Additional facilities for processing mixed wastes</i> 	<ul style="list-style-type: none"> • an estimated total processing/handling cost, including disposal of garbage and residues, of \$253 million (@ a disposal fee of \$85/tonne) • tipping/handling fees and processing costs charged to generators depend on waste material, volumes and the type of handling program • total cost of processing dry recyclables based on unit costs for processing different materials (varying from \$40/tonne for OCC to \$115/tonne for mixed wastes) multiplied by the quantities of each material processed. • cost of disposing residues assumed to be included in tipping fee (one reason why unit cost for mixed waste relatively high) • various programs likely would be established including the collection of source separated materials and garbage as well as programs which involve collection of mixed wastes with limited source separation (possibly only wet dry) to be processed at another facility • programs would depend on the particular circumstances of the generator, storage space, types and quantities of waste materials generated 	<ul style="list-style-type: none"> • market development may have a positive effect on costs of processing charged to IC&I waste generators • processing larger volumes of wastes may allow economies of scale to be passed on to IC&I waste generators 	<ul style="list-style-type: none"> • an estimated total processing/handling cost, including disposal of garbage and residues, of \$253 million (@ a disposal fee of \$85/tonne) • total cost of processing dry recyclables based on unit costs for processing different materials (varying from \$40/tonne for OCC to \$115/tonne for mixed wastes) multiplied by the quantities of each material processed. • cost of disposing residues assumed to be included in tipping fee
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<p>IC&I Processing – Wet Wastes</p> <ul style="list-style-type: none"> Centralized windrow composting of source-separated IC&I organics On-site composting of source separated organics generated by the IC&I sector Vermicomposting at some IC&I locations Rendering of food wastes from IC&I sector <i>New composting facility (in-vessel) for IC&I organics</i> 	<ul style="list-style-type: none"> an estimated total processing/handling cost for wet waste of \$16 million, including disposal of wet garbage and residues (@\$85/tonne disposal fee) cost of processing wet wastes based on the unit cost of processing at a centralized facility such as Scotts Farm (approximately \$30/tonne) multiplied by the quantity of wet organics processed this may be high as other markets involving different processing methods may have lower associated costs to the generator cost of disposing rejected residues or of unmarketable product, if any, assumed to be included in the price of \$30/tonne 	<ul style="list-style-type: none"> windrow composting is a cost-effective method; in-vessel options may have higher costs though economies of scale may be realized and reflected in the price charged to IC&I generators operational improvements may lower costs strong market revenues for finished compost would lower cost good source separation will improve compost quality 	<ul style="list-style-type: none"> an estimated total processing/handling cost for wet waste of \$16 million, including disposal of wet garbage and residues (@\$85/tonne disposal fee) cost of processing wet wastes based on the unit cost of processing at a centralized facility such as Scotts Farm (approximately \$30/tonne) multiplied by the quantity of wet organics processed cost of disposing rejected residues or of unmarketable product, if any, assumed to be included in the price of \$30/tonne
<p>IC&I Reuse</p> <ul style="list-style-type: none"> Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators Use of food wastes as animal feed Use of food waste for human consumption Landspreading of IC&I organics Use of refillable containers (refillable bottles, refillable pails or drums, etc) Use of re-usable packaging (e.g. reusable plastic and wood pallets, etc.) 	<ul style="list-style-type: none"> costs estimated to be relatively low 	<ul style="list-style-type: none"> higher volumes likely would have a positive effect of lowering prices charged to IC&I generators 	<ul style="list-style-type: none"> costs expected to be low

<p>IC&I Reduction</p> <ul style="list-style-type: none"> • voluntary waste reduction actions by small IC&I generators. • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse • Mandatory development of waste reduction action plans by designated major IC&I generators (defined in 3Rs regulations). • Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations). 	<ul style="list-style-type: none"> • difficult to assign a cost to waste reduction initiatives as they can be very diverse and little information is available. • costs may include investment in research (audits and technology development), substitution of more costly materials, shorter shelf-life of non-durable consumer goods which may require more costly operational regimes (retail/wholesale sectors), and others 	<ul style="list-style-type: none"> • Develop systems to monitor source reduction costs 	<ul style="list-style-type: none"> • limited cost data available
<p>IC&I Programs</p> <ul style="list-style-type: none"> • Voluntary waste audits performed by small IC&I generators • Independent voluntary waste reduction programs in small private companies • Mandatory waste audits by designated major IC&I generators (defined in 3Rs regulations) • Mandatory packaging audits by designated major packaging generators (3Rs regulations) • Voluntary packaging reporting by packaging users (NAPP) 	<ul style="list-style-type: none"> • waste audits and workplans are site and establishment-specific even for larger corporations. • audits may cost between \$2500 and \$50,000/facility, depending on the size and diversity of activities • For smaller establishments the absolute costs may be less • packaging audits are generally more costly as information on external factors such as recycled content of purchased materials is required. 	<ul style="list-style-type: none"> • provision of support and advisory services may provide cost efficiencies for individual establishments 	<ul style="list-style-type: none"> • costs are expected to be relatively low

<p>IC&I Promotion & Education</p> <ul style="list-style-type: none"> • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations • Mandatory posting of waste reduction plans for review by employees of designated major IC&I generators (3Rs regulations) 	<ul style="list-style-type: none"> • costs are relatively low, typically a few dollars per employee per year • for in-house activities, existing infrastructure may be used, such as newsletters and bulletins for promotion of waste reduction initiatives 	<ul style="list-style-type: none"> • valuable enhancement to improve performance of systems 	<ul style="list-style-type: none"> • considered to be relatively low cost
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TABLE 2
GTA ICI SYSTEMS
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: GTA
 SYSTEM: IC&I Existing

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Tonne Diverted				
Indicator - \$/tonne diverted	\$112	<ul style="list-style-type: none"> • substitute recycling tonnages for disposal tonnages (recycling cost lower than disposal cost for some materials such as fibres, wood) • economies of scale of recovery could lower costs • increase promotion and education to affect greater voluntary participation • market development will lower costs 	\$112	<ul style="list-style-type: none"> • relatively low diversion cost

TABLE 2
GTA ICI SYSTEMS
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: GTA
SYSTEM: IC&I Existing/Committed

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Tonne Diverted				
Indicator - \$/tonne diverted	\$114- \$116	<ul style="list-style-type: none"> • substitute recycling tonnages for disposal tonnages (recycling cost lower than disposal cost for some materials such as fibres, wood) • economies of scale of recovery could lower costs • increase promotion and education to affect greater voluntary participation • market development will lower costs 	\$114- \$116	<ul style="list-style-type: none"> • essentially same as existing system diversion cost

TABLE 2
GTA ICI SYSTEMS
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: GTA
SYSTEM: IC&I Extended 3Rs Regulations

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Tonne Diverted				
Indicator – \$/tonne diverted	\$117	<ul style="list-style-type: none"> • substitute recycling tonnages for disposal tonnages (recycling cost lower than disposal cost for some materials such as fibres, wood) • economies of scale of recovery could lower costs • increase promotion and education to affect greater voluntary participation of those not included in regulations - less significant than in Systems 1 and 2 • increase promotion and education to affect greatest compliance • market development will lower costs 	\$117	<ul style="list-style-type: none"> • essentially same as existing system diversion cost

**TABLE 2
GTA ICI SYSTEMS
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: GTA
SYSTEM: IC&I Expanded 3Rs Regulations

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Cost per Tonne Diverted				
Indicator - \$/tonne diverted	\$120	<ul style="list-style-type: none"> • economies of scale of recovery could lower costs • increase promotion and education to affect greater voluntary participation of those not included in regulations - less significant than in Systems 1 and 2 • increase promotion and education to affect greatest compliance • market development will lower costs 	\$120	<ul style="list-style-type: none"> • essentially same as existing system diversion cost

**TABLE 2
GTA ICI SYSTEMS
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: GTA
SYSTEM: IC&I Expanded 3Rs Regulations with Organics

Criteria/Indicator	Effects by Indicator	Mitigation/Enhancement	System Net Effects by Criterion	Advantages/Disadvantages by Criterion
Criterion - Cost per Tonne Diverted				
Indicator - \$/tonne diverted	\$117	<ul style="list-style-type: none"> economies of scale of recovery could lower costs increase promotion and education to affect greater voluntary participation of those not included in regulations - less significant than in Systems 1 and 2 increase promotion and education to affect greatest compliance market development will lower costs 	\$117	<ul style="list-style-type: none"> essentially same as existing system diversion cost

TABLE 2
GTA ICI SYSTEMS
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: GTA
SYSTEM: No Unprocessed Waste to Landfill

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion – Cost per Tonne Diverted				
Indicator – \$/tonne diverted	\$215	<ul style="list-style-type: none"> • economies of scale of recovery could lower costs • increase promotion and education to affect greatest compliance • market development will lower costs • possible cost benefits from encouraging greatest amount of source separation within range of options • disposal costs are included in diversion cost since all waste assumed collected for processing or at least, for handling by processing facilities. 	\$215	<ul style="list-style-type: none"> • most expensive of waste management systems

**TABLE 2
GTA ICI SYSTEMS
SYSTEM NET EFFECTS TABLE**

REGIONAL MUNICIPALITY: GTA
SYSTEM: IC&I Existing

Criteria/Indicator	Effects by Indicator	Mitigation/Enhancement	System Net Effects by Criterion	Advantages/Disadvantages by Criterion
Criterion - Total System Cost				
Indicator - \$ Total System	<ul style="list-style-type: none"> • \$335 million (@\$50/tonne disposal fee) • \$416 million (@\$85/tonne disposal fee) • \$451 million (@\$100/tonne disposal fee) 	<ul style="list-style-type: none"> • substitute recycling tonnages for disposal tonnages (recycling cost lower than disposal cost for some materials such as fibres, wood) • economies of scale of recovery could lower costs • increase promotion and education to affect greater voluntary participation • market development will lower costs 	<ul style="list-style-type: none"> • \$335 million (@\$50/tonne disposal fee) • \$416 million (@\$85/tonne disposal fee) • \$451 million (@\$100/tonne disposal fee) 	

TABLE 2
GTA ICI SYSTEMS
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: GTA

SYSTEM: IC&I Existing/Committed

Criteria/Indicator	Effects by Indicator	Mitigation/Enhancement	System Net Effects by Criterion	Advantages/Disadvantages by Criterion
Criterion - Total System Cost				
Indicator - \$ Total System	<ul style="list-style-type: none"> • \$338 million to \$341 million (@\$50/tonne disposal fee) • \$416 million to \$417 million (@\$85/tonne disposal fee) • \$449 million to \$451 million (@\$100/tonne disposal fee) 	<ul style="list-style-type: none"> • depends in part on capture rate of regulations - higher capture rate yields lower cost due to substitution of lower cost recycling for disposal for many materials • economies of scale of recovery could lower costs • increase promotion and education to affect greater voluntary participation • market development will lower costs 	<ul style="list-style-type: none"> • \$338 million to \$341 million (@\$50/tonne disposal fee) • \$416 million to \$417 million (@\$85/tonne disposal fee) • \$449 million to \$451 million (@\$100/tonne disposal fee) 	<ul style="list-style-type: none"> • essentially same as Existing System total cost

TABLE 2
GTA ICI SYSTEMS
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: GTA
SYSTEM: IC&I Extended 3Rs Regulations

Criteria/Indicator	Effects by Indicator	Mitigation/Enhancement	System Net Effects by Criterion	Advantages/Disadvantages by Criterion
Criterion - Total System Cost				
Indicator - \$ Total System	<ul style="list-style-type: none"> • \$349 million (@\$50/tonne disposal fee) • \$411 million (@\$85/tonne disposal fee) • \$437 million (@\$100/tonne disposal fee) 	<ul style="list-style-type: none"> • substitute recycling tonnages for disposal tonnages (recycling cost lower than disposal cost for some materials such as fibres, wood) • economies of scale of recovery could lower costs • increase promotion and education to affect greater voluntary participation of those not included in regulations - less significant than in Systems 1 and 2 • increase promotion and education to affect greatest compliance • market development will lower costs 	<ul style="list-style-type: none"> • \$349 million (@\$50/tonne disposal fee) • \$411 million (@\$85/tonne disposal fee) • \$437 million (@\$100/tonne disposal fee) 	<ul style="list-style-type: none"> • essentially same as Existing System total cost

TABLE 2
GTA ICI SYSTEMS
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: GTA

SYSTEM: IC&I Expanded 3Rs Regulations

Criteria/Indicator	Effects by Indicator	Mitigation/ Enhancement	System Net Effects by Criterion	Advantages/ Disadvantages by Criterion
Criterion - Total System Cost				
Indicator - \$ Total System	<ul style="list-style-type: none"> \$359 million (@\$50/tonne disposal fee) \$411 million (@\$85/tonne disposal fee) \$434 million (@\$100/tonne disposal fee) 	<ul style="list-style-type: none"> economies of scale of recovery could lower costs (not considered in this analysis) increase promotion and education to affect greater voluntary participation of those not included in regulations - less significant than in Systems 1 and 2 increase promotion and education to affect greatest compliance market development will lower costs 	<ul style="list-style-type: none"> \$359 million (@\$50/tonne disposal fee) \$411 million (@\$85/tonne disposal fee) \$434 million (@\$100/tonne disposal fee) 	<ul style="list-style-type: none"> essentially same as Existing System total cost

TABLE 2
GTA ICI SYSTEMS
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: GTA

SYSTEM: IC&I Expanded 3Rs Regulations with Organics

Criteria/Indicator	Effects by Indicator	Mitigation/Enhancement	System Net Effects by Criterion	Advantages/Disadvantages by Criterion
Criterion - Total System Cost				
Indicator - \$ Total System	<ul style="list-style-type: none"> \$358 million (@\$50/tonne disposal fee) \$403 million (@\$85/tonne disposal fee) \$422 million (@\$100/tonne disposal fee) 	<ul style="list-style-type: none"> economies of scale of recovery could lower costs increase promotion and education to affect greater voluntary participation of those not included in regulations - less significant than in Systems 1 and 2 increase promotion and education to affect greatest compliance market development will lower costs 	<ul style="list-style-type: none"> \$358 million (@\$50/tonne disposal fee) \$403 million (@\$85/tonne disposal fee) \$422 million (@\$100/tonne disposal fee) 	<ul style="list-style-type: none"> essentially same as Existing System total cost

TABLE 2
GTA ICI SYSTEMS
SYSTEM NET EFFECTS TABLE

REGIONAL MUNICIPALITY: GTA

SYSTEM: No Unprocessed Waste to Landfill

Criteria/Indicator	Effects by Indicator	Mitigation/Enhancement	System Net Effects by Criterion	Advantages/Disadvantages by Criterion
Criterion - Total System Cost				
Indicator - \$ Total System	<ul style="list-style-type: none"> \$431 million (note disposal cost included in mixed waste processing fee which corresponds to \$85/tonne disposal fee) 	<ul style="list-style-type: none"> economies of scale of recovery could lower costs increase promotion and education to affect greatest compliance market development will lower costs possible cost benefits from encouraging greatest amount of source separation within range of options 	<ul style="list-style-type: none"> \$431 million (note disposal cost included in mixed waste processing fee which corresponds to \$85/tonne disposal fee) 	<ul style="list-style-type: none"> essentially same as Existing System total cost



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TD/789/T6/G74/APP-CT/MOE

TD/789/T6/G74/APP-CT/MOE

Ontario Ministry of Enviro
Greater Toronto area

3Rs analysis - cost asap

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